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CANADIAN GEOGRAPHICAL JOURNAL

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THE CANADIAN GEOGRAPHICAL SOCIETY

OTTAWA, CANADA

The Society's ambition is to make itself a real force in advancing geographical knowledge, and in disseminating information on the geography, resources and people of Canada. In short, its aim is to make Canada better known to Canadians and to the rest of the world.

As one of its major activities in carrying out its purpose, the Society publishes a monthly magazine, the Canadian Geographical Journal, which is devoted to every phase of geography—historical, physical and economic—of Canada, of the British Commonwealth and of the other parts of the world in which Canada has special interest. It is the intention to publish articles in this magazine that will be popular in character, easily read, well illustrated and educational to the young, as well as informative to the adult.

The Canadian Geographical Journal will be sent to each member of the Society in good standing. Membership in the Society is open to any one interested in geographical matters. The annual fee for membership is four dollars (Canadian currency)

The Society has no political or other sectional associations, and is responsible only to its members. All money received is used in producing the Canadian Geographical Journal and in carrying on such other activities for the advancement of geographical knowledge as funds of the Society may permit.

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COVER SUBJECT:—*The R.C.A.F.'s CF-100 Canuck all-weather day and night jet fighter.* Photograph by Department of National Defence—R.C.A.F.

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Canadair's production line for the Sabre is a good example of the mass manufacture of airframes in Canada.

A section of the drafting room at Canadair. This view gives an excellent impression of the large area covered by such a department.

Aeroplane Industry in Canada

by JOHN DAVIS

SINCE the outbreak of war in Korea, aircraft production has once more become one of Canada's major industries. Thousands of Canadians are now finding employment making aircraft and engines; and aeroplanes, some of them involving contracts running to hundreds of millions of dollars, are again rolling off the nation's production lines.

The same sort of thing happened during World War II. Canadians are designing and developing some of the aircraft and aircraft engines they are producing. Production, too, is being planned in such a way as to have a more lasting effect on the Canadian economy. New plants are being completed and new skills are being acquired which will provide a nucleus from which an even larger program can be launched in an emergency. They will, at the same time, help to diversify still further Canada's other manufacturing industries.

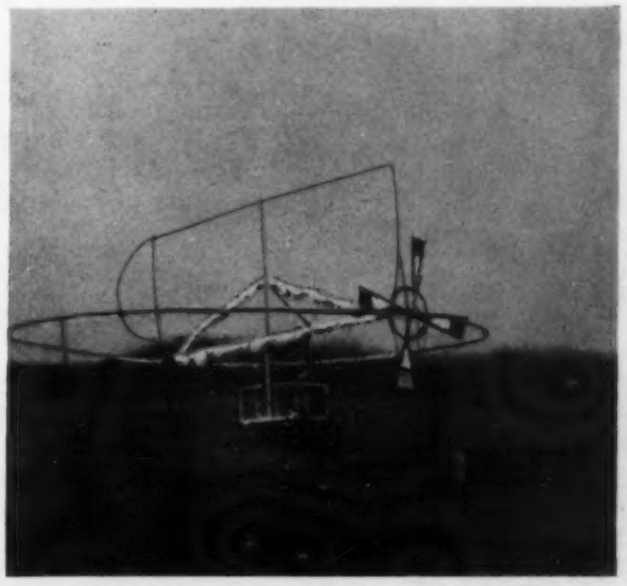
Like its counterparts elsewhere, the industry has had its ups and downs, particularly on the production side. But it has always come back with renewed vigour, not only to serve Canadian requirements, but also to sell many of its products abroad, in competition with some of the world's best known manufacturers of aircraft.

It has been no easy task. And it is not getting any easier, for modern aircraft are becoming increasingly complex. Today's flying machine is a composite of a thousand inventions. It is a product of no one mind or group of minds. Neither is it simply a product of any one company or group of companies. It frequently involves more than the combined scientific skill and industrial knowledge of any one nation.

Any country, and especially any member of a broad freedom-loving alliance like the North Atlantic Treaty Organization, is therefore wise to select carefully those aircraft and aircraft components which it is to produce. Canada, in following this course, is not trying to manufacture every kind of aircraft, or type of aircraft equipment which her armed forces may conceivably require. Rather, she has undertaken to make only those types which she can produce efficiently for her own needs and those of her Allies, and at the same time to buy elsewhere those other types and components which are necessary to ensure that her own armed forces will continue to be among the best equipped in the world.

Background of the Industry

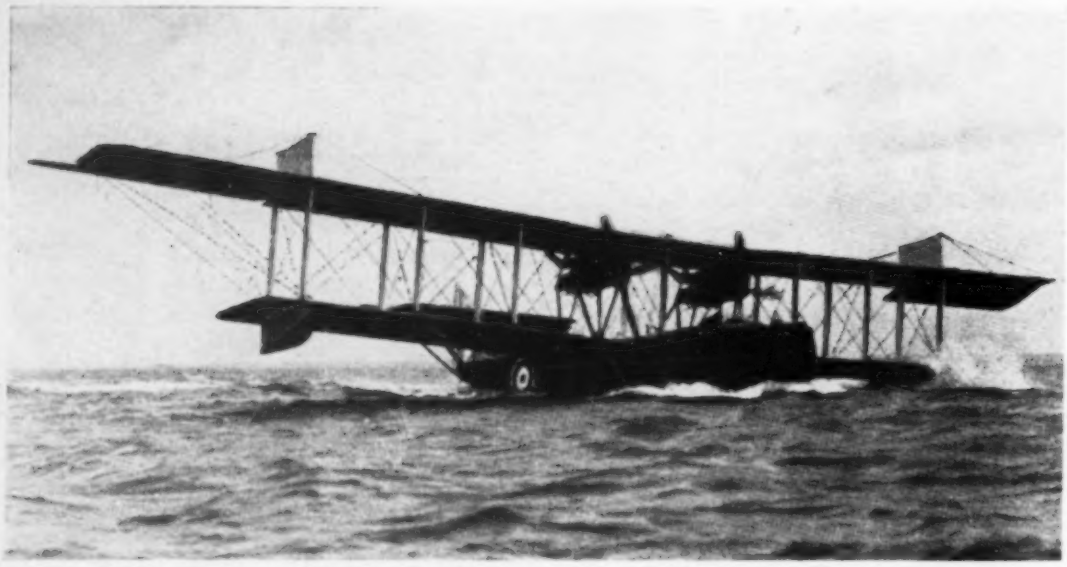
The international character of this industry is no present-day phenomenon. Even the Wright brothers, in preparing for their epoch-making flight in 1903, owed a great deal to the writings and experiments of earlier scientists and inventors. They had studied Leonardo da Vinci's imaginative drawings of flying machines; they had drawn heavily on the experience and writing of pioneers like LeBris and Adler in France, of Lillienthal and Chanut in Germany, and



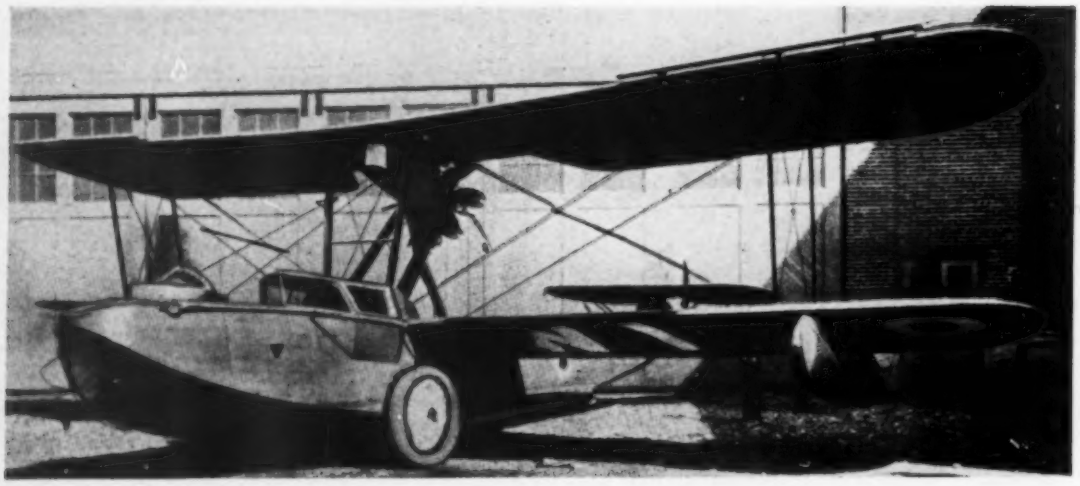
The Underwood machine as it appeared upon completion. When it was necessary to move the craft on the ground the canvas lifting and control surfaces were untied from the framework and furled, just as the sails of a ship are furled. This was particularly important if stiff winds were blowing when the machine was being moved. In this photo, surfaces are shown furled.

Frank H. Ellis photo

The author makes grateful acknowledgment of the assistance of Mr. Kuhring in preparing the article and of Mr. D. C. Johnson in making the charts.



F. 5 flying boat built in quantity in Toronto in 1918 for the American government.



The Vedette flying boat built by Canadian Vickers in the mid-twenties. It was used primarily for photographic work by the R.C.A.F. and for forest patrol work.

The Noorduyn Norseman, as delivered to the U.S. Air Force. This aeroplane, which was designed and built in Canada in the mid-thirties, is used extensively for bush flying in northern Canada, and was an all-purpose aircraft used by the Allies during World War II.

Maxim and Langley in the United States; and they had at their disposal what no one before them had—an engine light enough and yet of sufficient power to make their craft airborne. Thus some of the credit is due to Otto in Germany, who first enunciated the principles of the internal combustion engine and some must go to the budding automobile industry which was already pressing on with its development.

Among the first to try their hand at flying in Canada were the Underwood brothers, John, George and Elmer, of Stettler, Alberta. As early as the summer of 1907 they built and successfully flew what today's enthusiasts would probably refer to as some sort of "flying saucer". Despite its many shortcomings—and this included the fact that no suitable engine could be found to make it airborne in other than a stiff breeze—this giant circular kite made more than local history. It achieved the first flight from a specially constructed aerodrome in Canada, and it proved to the part-time designer-aviators of their day that ingenuity could do wonders. But then, as later, genius and enthusiasm were not enough, and it was mainly due to lack of funds that this remarkable project was finally abandoned.

Another and much more publicized event was the flight of the now famous "Silver Dart" over the Bras d'Or Lakes on Cape Breton Island early in 1909. This, the first heavier-than-air machine to be flown by a British citizen anywhere in the Empire, was designed and built by a team of Canadian and American engineers and scientists.[1]

With each passing year there was more to report. Numerous flights were made by Canadian aviators in Canadian-built aircraft prior to 1914.[2] Some were successful and others ended in near catastrophe. On the engineering side there was Wallace Rupert Turnbull, a native of the Maritime Provinces, one of the world's first serious aerodynamicists. Beginning as early as 1902, he is known to have been calculating the lift and drag characteristics of aerofoils. He built one of the world's first wind tunnels near his home in Rothesay, N.B., and later as a result of his numerous experiments, he became a world-renowned authority in wing and propeller design. To his credit are a number of inventions, one of the most outstanding of which is the electrically-controlled variable incidence propeller now widely used on many of today's higher power aero engines.

Still other Canadians were interested in production. The nation's first factory, known for a time as The Curtiss Aeroplane and Motor Company Limited, was operating in Toronto for several years before World War I broke out. It is noteworthy for the fact that it filled Canada's first export order involving twenty Curtiss Jenny aircraft for Spain. Also, it provided a ready locale for the production of trainer aircraft so badly needed by the Imperial Munitions Board during the first great war. In all, some three thousand of these odd-looking planes were built there between 1916 and 1918, mainly for the British Government.

By today's standards, these wirebound wood and canvas "crates" were crude indeed. But they had one real virtue. They could be produced in great numbers and at relatively short notice. How else could over a thousand of them have been built within a period of three short months, and the entire three thousand turned out in less than a year and a half. And this was hardly the slap-dash effort which some of our moderns would have us believe. For they were the aircraft used in the training of such famous Canadians in the Royal Flying Corps as Barker, Bishop, Collishaw and MacLaren, men who were to rank among the greatest air aces of all times.

Mention has not yet been made of the

1 Among the Canadians in this team were F. W. (Casey) Baldwin, the first man to make a public flight in a heavier-than-air machine in America; J. A. D. McCurdy, who was the first man to fly an aeroplane in Canada; Lt. T. Selfridge, who flew the association's first kite, the "Cygnet" near Baddeck, N.S., late in 1907; and Glen H. Curtiss, after whom Canada's first aeroplane factory was named. This project was largely financed by the wife of Sir Alexander Graham Bell and urged on by that intrepid inventor himself.

2 W. Gibson built and flew his own engine and aircraft at Mt. Tolmie, B.C., in Sept. 1910; Messrs. Templeton and McMullen accomplished much the same thing in Vancouver in 1911; others were the Pepper Brothers in Davidson, Sask. (1911); Wm. Straith, Manitoba's first designer-airman (1908-1914); and Thos. Blakely and Frank Ellis of Alberta (1914-1915).

The Hawker Hurricane, of Battle of Britain fame, was produced in quantity at the Fort William plant of Canadian Car.

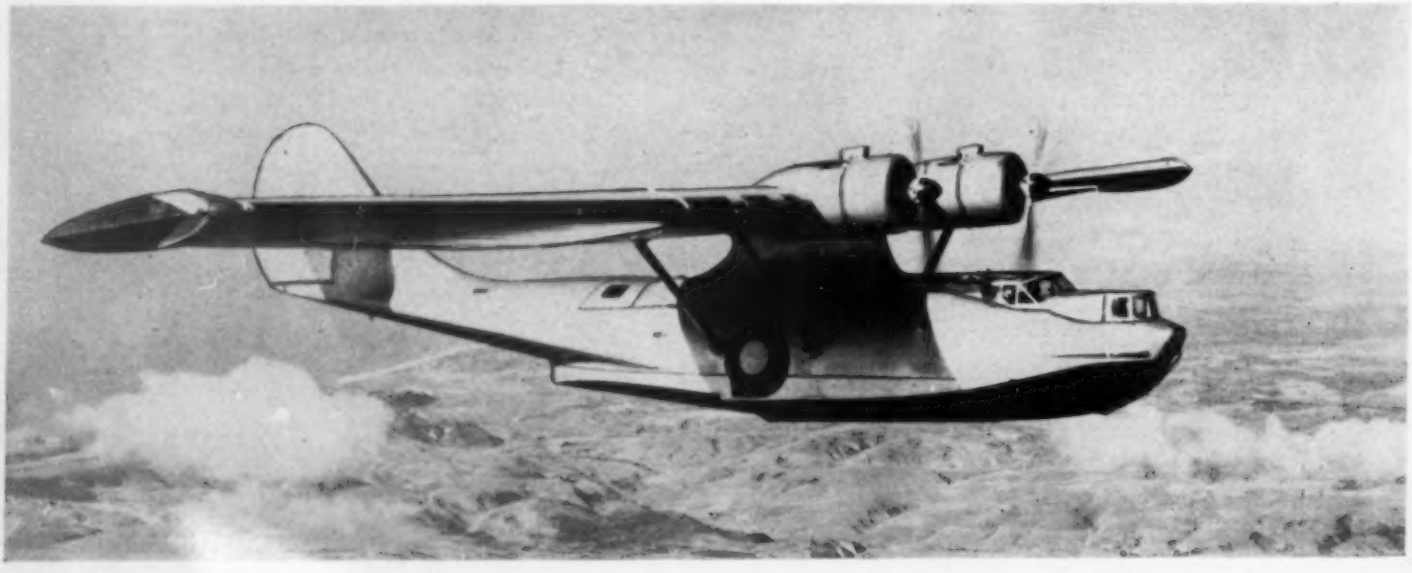
several dozen flying boats which were also built in Canada in 1918—in this case for the United States Government. Here again is something for today's production men to think about. These twin-engine Felixstowe flying boats, with a wingspread comparable to the largest four-engine bombers of World War II, were put together at great speed. The first of these biplanes was out in thirty days, and the entire order was completed in less than eight months from the day it was received. Canada can hardly have been called a highly industrialized nation in those days but its aeronautical performance, by any standard, was an enviable one.

Nevertheless, there was something of a hiatus in aircraft construction in the years immediately following the first World War. In 1923, however, fresh stirrings began. It was then that the Canadian Government placed its first contract for military aircraft, the understanding being that they should be produced, as far as possible, in this country. Eight single-engine amphibians of the Viking class were subsequently ordered from Canadian Vickers Limited, two being brought in from England and six subsequently being built in Montreal. These were followed by the Canadian designed and built Vedette, which later proved so useful in forestry patrol work, also by numerous other projects[3] including the construction of the Velos for the Canadian Government. This in 1928, was reported to be the largest seaplane of its kind in the world.

No longer the product of any one designer-inventor, they took more time to develop. But this was only a symptom of a change which was becoming general throughout the aircraft industry the world over. Individual engineers, with a "sixth sense" in the air, were losing out to the specialists, and once-and-for-all designs were giving way to

3 These included the Canadian Vickers Vanessa, Varuna, Vista, and Vigil, all of which were completed in 1927. None of these latter aircraft were built in quantity however.

PBY Canso flying boat, produced by Vickers, Montreal; used mainly for maritime reconnaissance and rescue.



patient testing and a long sequence of production modifications. A few were slow in learning this lesson, and as a result several once well-known firms were to fall by the wayside. But other companies with vision and persistence survived. Mainly through their own initiative, and sometimes with the aid of governments contracts, they were to join the ranks of the world's major aircraft producers.

Meanwhile, something else was happening. For the first time, reasonably reliable aircraft engines were becoming available. They had been largely make-shift in character until the late 1920s. But, as the industry began to apply better and lighter weight materials, its safety record began to show a marked improvement. This and greater fuel economy was all that was necessary to ensure the future of commercial aviation in Canada.

With government assistance in the form of navigational aids and airport construction, the number of passenger and airmail miles flown skyrocketed from the mid 1920s onward. "Bush flying" became an acceptable alternative, wherever navigable rivers or rail and highway transportation facilities were lacking. It was during these early years, and because of the circumstances in which they found themselves, that Canadians really pioneered the air freight business, and obtained experience and set precedents from which many other countries were to benefit in the years that followed.

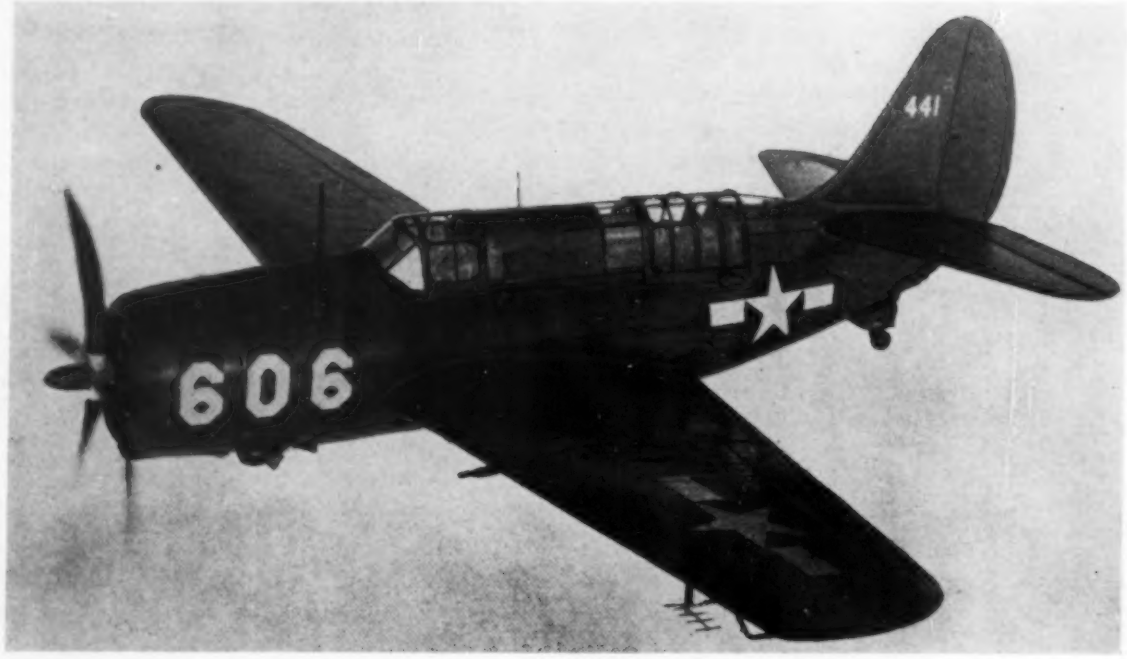
All of this, of course, helped the manufacturers to become better established. Not only were repair and overhaul depots kept busy, but several firms made noteworthy contributions of their own by developing such ancillary equipment as skis and floats, or by installing built-in freight handling equipment. The famous Noorduyn Norseman was constructed specifically to fly in and out of awkward and otherwise inaccessible places. And numerous imported aircraft were modified to meet Canadian conditions.

This was the industry which, a few years later, was called upon to expand in the interests of national defence. The initial call came for elementary trainers, first for the United Kingdom and soon afterwards in support of the British Commonwealth Air Training Plan. But its role was soon to change, for following the fall of France in 1940 it was called upon to produce front line aircraft as well. Within a matter of months production lines had been laid down for as many as nine operational types, and by 1943 Canada's output of all types of aircraft had reached a rate of four thousand a year.

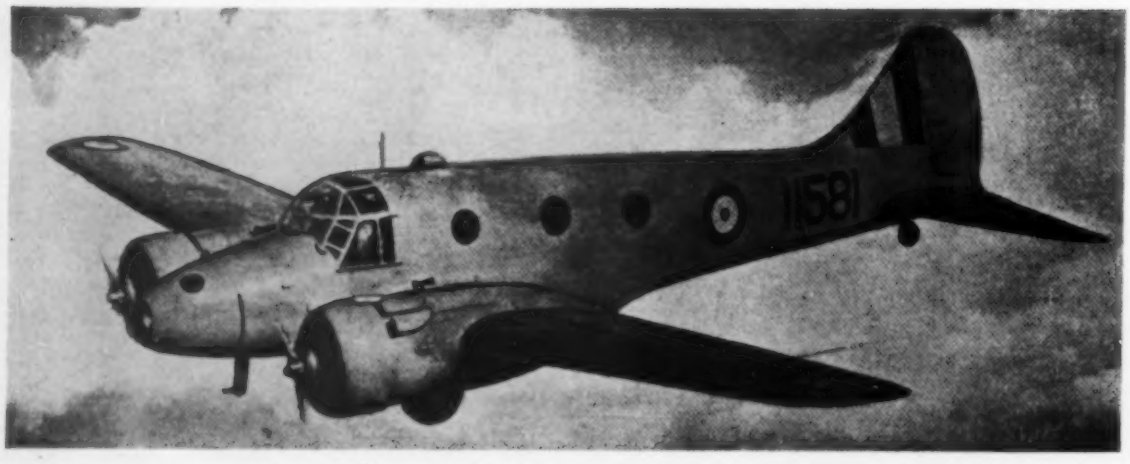
In all, some 16,400 military planes were constructed in Canada during World War II. Four thousand of them were of the front-line variety, and this included short-range and night fighters, light, medium and heavy bombers, dive bombers, flying boats, and

The Canadian version of the Bristol Blenheim, the Bolingbroke, built by Fairchilds, Montreal.

A mainstay of the Royal Canadian Air Force training program, the Harvard T-6 Trainer, manufactured at the Can-Car Fort William Plant.



The Curtiss Helldiver was produced in quantity for the U.S. Air Force at Fort William.



The Canadian designed and built Avro Anson MKV, produced by MacDonald Bros. of Winnipeg, was used extensively in training navigators.

army co-operation aircraft.[4] About half of these planes were on domestic account, the remainder being destined either for the United States armed forces, or built for the use of Canada's other allies.

The fact that this was done without too much fuss and turmoil should not obscure the tremendous impact which this effort had on the rest of the economy. In due course, aircraft production became Canada's largest single manufacturing industry. Numerous supporting facilities had to be rushed to completion, and these included plants for the smelting, refining, and fabrication of aluminum, magnesium, and a number of other non-ferrous metals. Plywood, plastics, adhesives, and special sheet-metal forming facilities had to be built up or expanded. Many of these ancillary industries have continued to operate on a relatively large scale in the post-war period, something which, with the exception of the acetylene chemicals industry and one lone aluminum refinery, did not happen after World War I.

The war also had a profound effect on the industry's corporate structure. Some of Canada's old companies like Noorduyn Aircraft Limited and Fairchilds were to disappear entirely; and others, including several impressive newcomers, were to take their place. Canadair Limited, a subsidiary of the General Dynamics Corporation of New York, replaced Canadian Vickers as the principal manufacturer in the Montreal area. A. V. Roe Canada Limited, a subsidiary of the Hawker Siddeley group in the United Kingdom, joined de Havilland Aircraft Company in the Toronto area. Regionally the industry also became better balanced. Fairey Aviation Limited, another well-known English company, took over former Crown-owned facilities near Halifax, N.S., while Macdonald Brothers were to continue operating on a much larger scale in the Winnipeg area.

4 Among the types of aircraft produced by Canada during World War II were:
Trainers: Tiger Moths, Fleet Finches, Fleet Forts, Cornells, Harvards and Ansons.
Bombers: Bolingbrokes, Hampdens, Mosquitos, Lancasters, Lincolns and Helldivers.
Flying Boats: Cansos and Sharks.
Army Co-operation Aircraft: Lysanders and Norsemen.
Fighters: Hawker Hurricane.

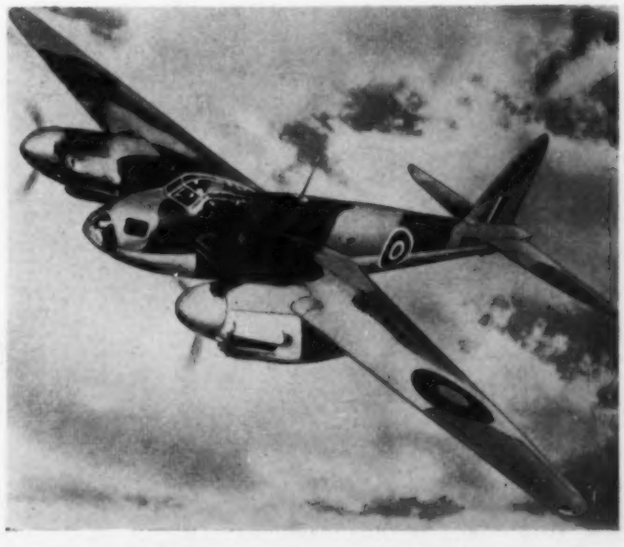
5 Direct and indirect employment (i.e. in all industries including component and materials suppliers) was at one time estimated to have reached 120,000 people.

Mosquito fighter bomber. Over one thousand of this famous aircraft were produced at the de Havilland plant, Toronto.

Post War Developments

Many other plants were closed down, and others were put to entirely different purposes. At one time during World War II, they totalled forty-five in number, but by 1948 they were down to eight. Direct employment fell off even more drastically, dropping from a peak of around 80,000[5] in 1944, to just over 8,000 four years later. Many of these skills were not lost, however. They, and most of the machine tools which were left over from Canada's wartime program, were later used to advantage in the manufacture of civilian products like farm machinery, light manufacturing equipment, furniture, and building materials. An outstanding example of the conversion of wartime acquired skills to civilian products was the adaptation of the Can-Car plant at Fort William for the manufacture of buses and trolley coaches, thereby instituting a new industry of fundamental importance in Canada.

Through it all a vital remnant has remained. The surviving aircraft firms began at once to look for civilian business and one or two were rewarded by what, for a country of Canada's industrial stature, may be regarded as resounding success. Canadair, for instance, by marrying an American designed airframe to a high-powered British engine, developed the much-discussed and now famous North Star airliner. Over seventy of these four-motored aircraft were built for such customers as Trans-Canada Air Lines, Canadian Pacific Airlines, and the Royal Canadian Air Force. Even British Overseas Airways Corporation bought twenty-two of them, a purchase



SOME OF CANADA'S KEY PLANTS OF THE AIR INDUSTRY

1. Rolls-Royce of Canada Limited, Montreal.

2. Lucas-Rotax Limited, Scarborough, Ontario.

3. A. V. Roe Canada Ltd.'s plants.

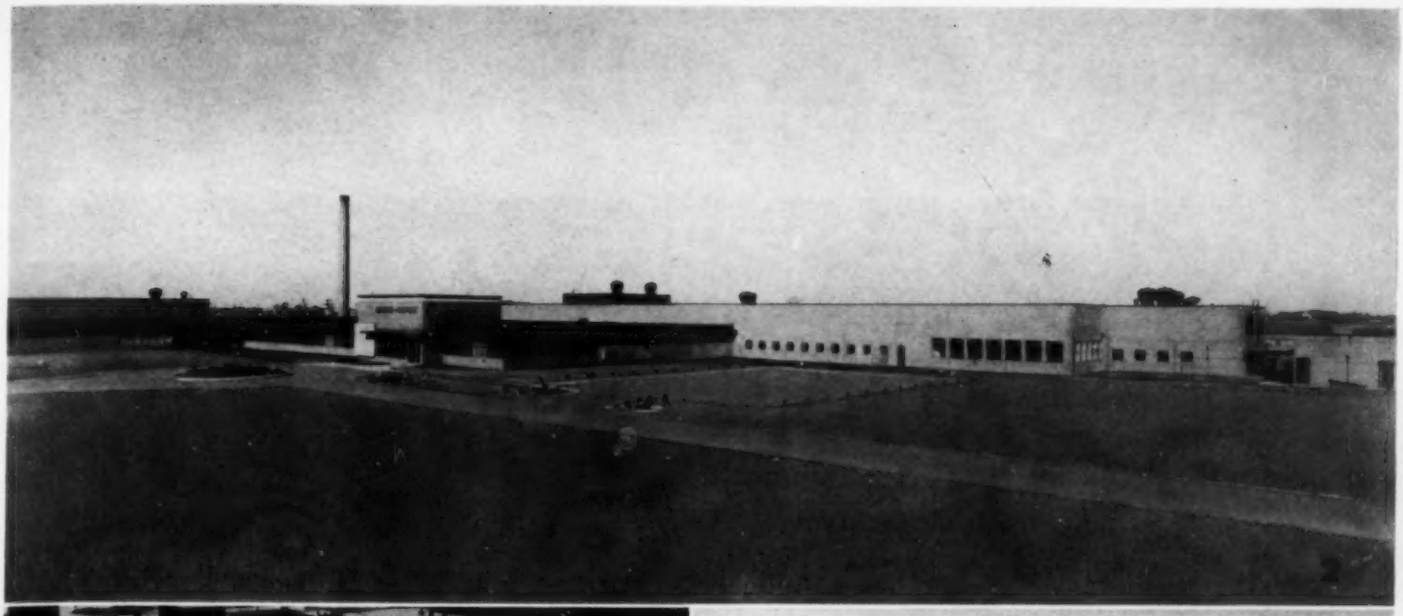
4. The new Avro gas turbine plant.

5. Canadian Steel Improvement Limited, Etobicoke, Ontario.

6. Canadair Limited, Montreal.

7. Canadian Pratt & Whitney Aircraft Company Limited, Ville Jacques Cartier, P.Q.

8. The Fairey Aviation Company of Canada Ltd., near Halifax.



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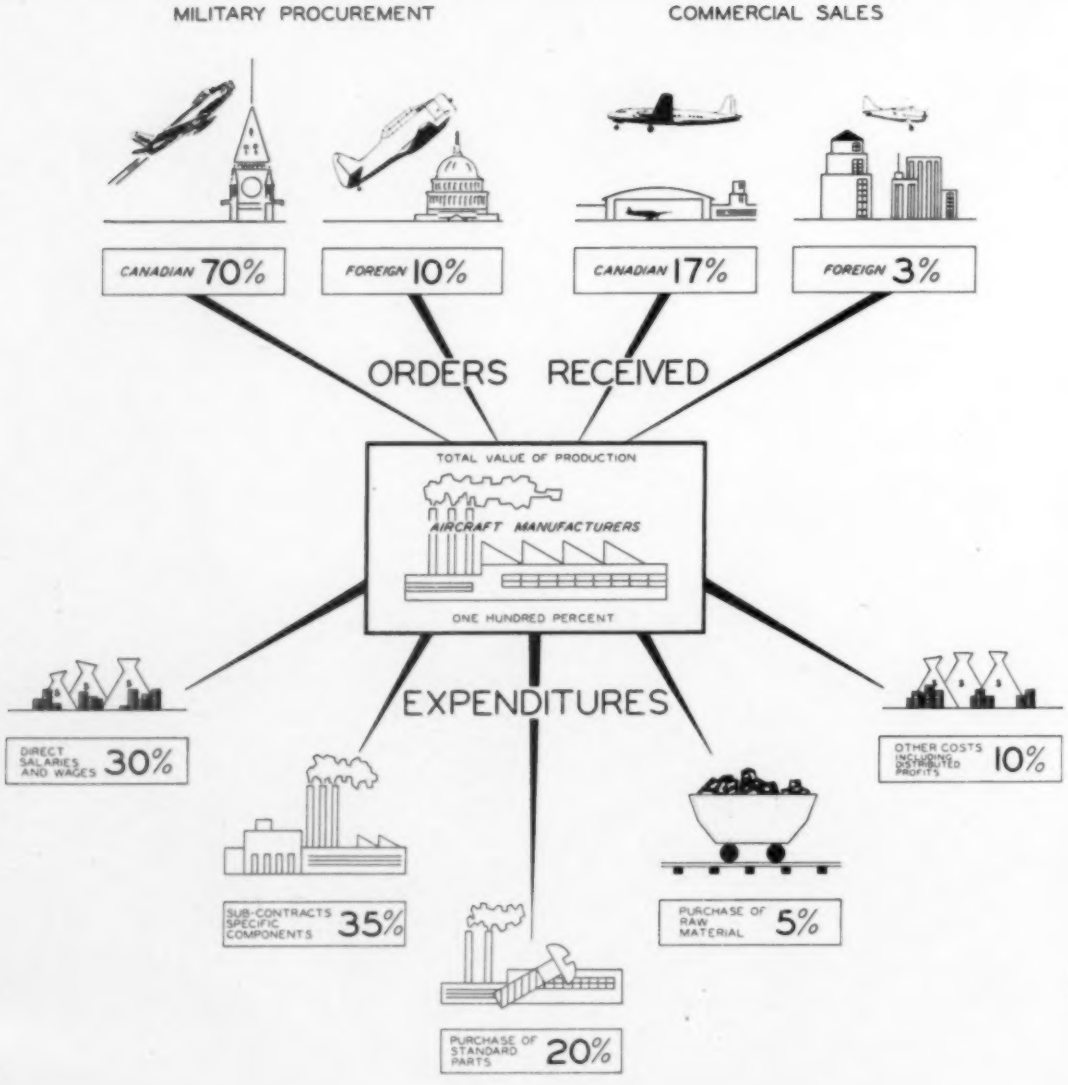
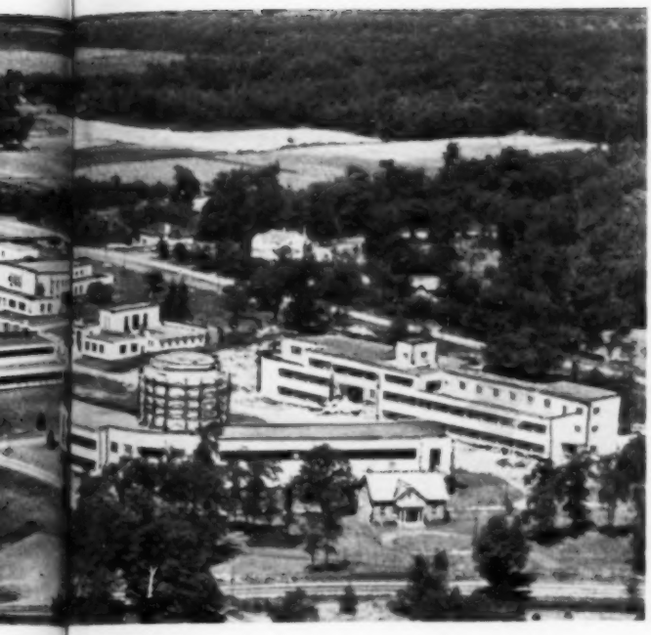

MILITARY PROCUREMENT
COMMERCIAL SALES
CANADIAN 70%
FOREIGN 10%
CANADIAN 17%
FOREIGN 3%
ORDERS RECEIVED
TOTAL VALUE OF PRODUCTION
AIRCRAFT MANUFACTURERS
ONE HUNDRED PERCENT
EXPENDITURES
DIRECT SALARIES AND WAGES 30%
SUB-CONTRACTS SPECIFIC COMPONENTS 35%
PURCHASE OF STANDARD PARTS 20%
PURCHASE OF RAW MATERIAL 5%
OTHER COSTS INCLUDING DISTRIBUTED PROFITS 10%



Aerial photograph showing the Ottawa facilities of the National Aeronautical Establishment.

which was made because these aeroplanes could be delivered much more quickly than similar types then under consideration in the United Kingdom.

In the small and medium plane class, the de Havilland Aircraft Company has continued to make a name for itself. First it designed, developed and built a primary trainer known as the Chipmunk. In production for more than five years, over one hundred and fifty of these planes were built and sold to a number of countries, including Egypt, Thailand, Iraq and India. While they are no longer built in Canada, they are currently in quantity production at the parent company's plant in England. The de Havilland Beaver, and its big brother the Otter, both of Canadian design and manufacture, have also been introduced. They continue Canada's tradition of building versatile single-engined planes suitable for bush country flying, planes which are being sold in increasing numbers, not only in Canada, but also to a number of foreign customers.[6]

As in the inter-war years, the industry has had its quota of disappointments. The Canadian Car & Foundry Loadmaster, really a flying wing freighter, excited considerable comment, but never reached the production stage, mainly for the reason that its performance was not up to earlier expectations. The Snitzer and Gottlieb helicopter, too, although it showed early promise, never got much beyond the development stage. AVRO's Jetliner was a special case. This, the first jet-propelled passenger plane to be designed and flown on this continent, was really a war casualty though there was every indication that, with some further

6 To date, some 600 Beaver aircraft have been built; 120 for Canadian customers, and the rest for export, mainly to the United States military forces and to commercial customers in some 20 different countries.

The Canadian designed and built de Havilland Beaver in operation with the U.S. Army Air Force in Korea.

Postwar Aircraft

1. *A CF-100 jet fighter being ground-checked prior to flight.*

2. *A flight of CF-100 jet fighters in formation over northern Ontario.*

3. *C-102 jet liner poised for take-off.*

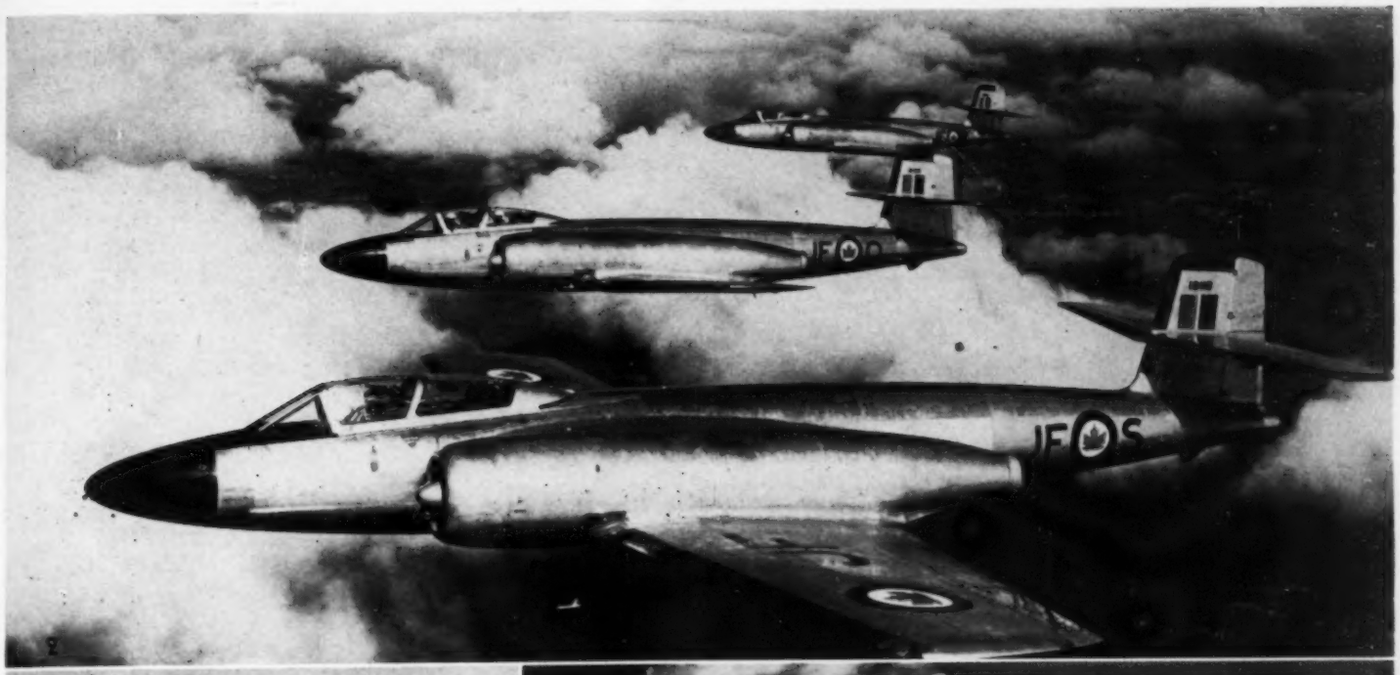
4. *Three R.C.A.F. Sabres in echelon over Montreal.*

5. *T-33 high-speed jet trainer, now in quantity production at Canadair.*

6. *The de Havilland Otter, 12 place light transport aircraft for operation on wheels, skiis or floats.*

7. *One of the first CF-100 all-weather jet fighters and the C-102 Avro jet liner transport, outside a hangar at Malton.*

8. *Canadair North Star civil transport over Dorval Airport, Montreal.*



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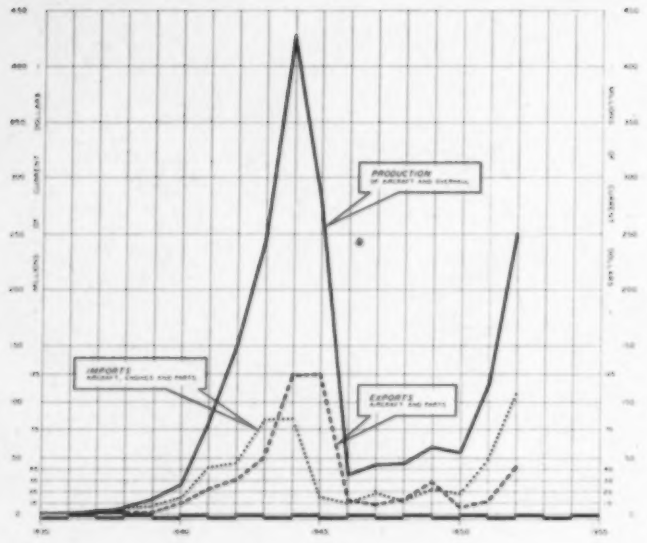
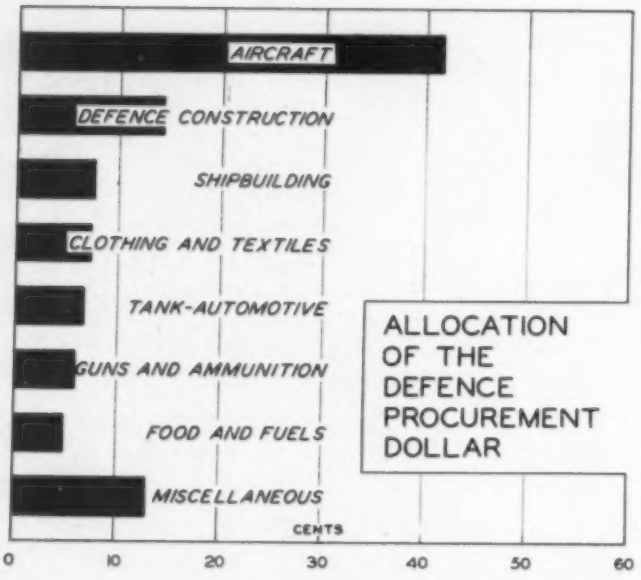
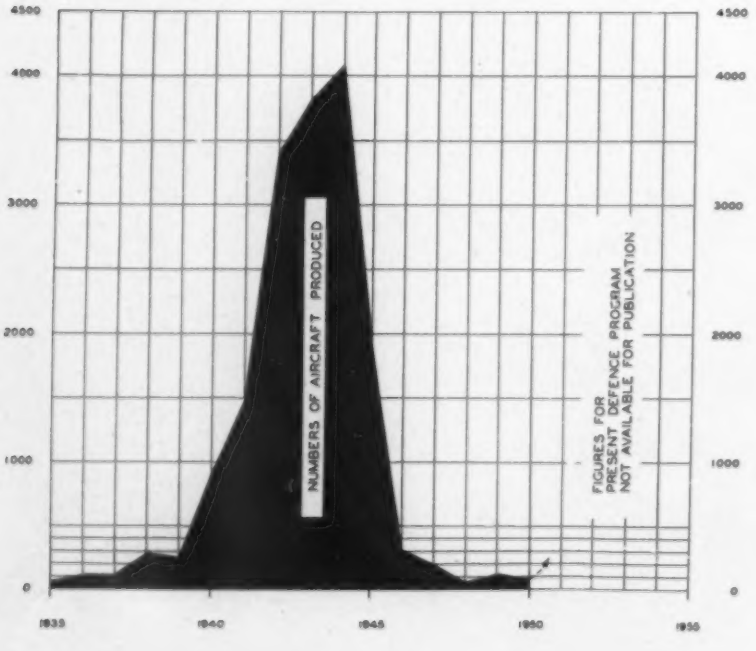






development, it would probably have sold widely on this continent. It was shelved in 1950 in order to make way for defence work following the outbreak of war in Korea.

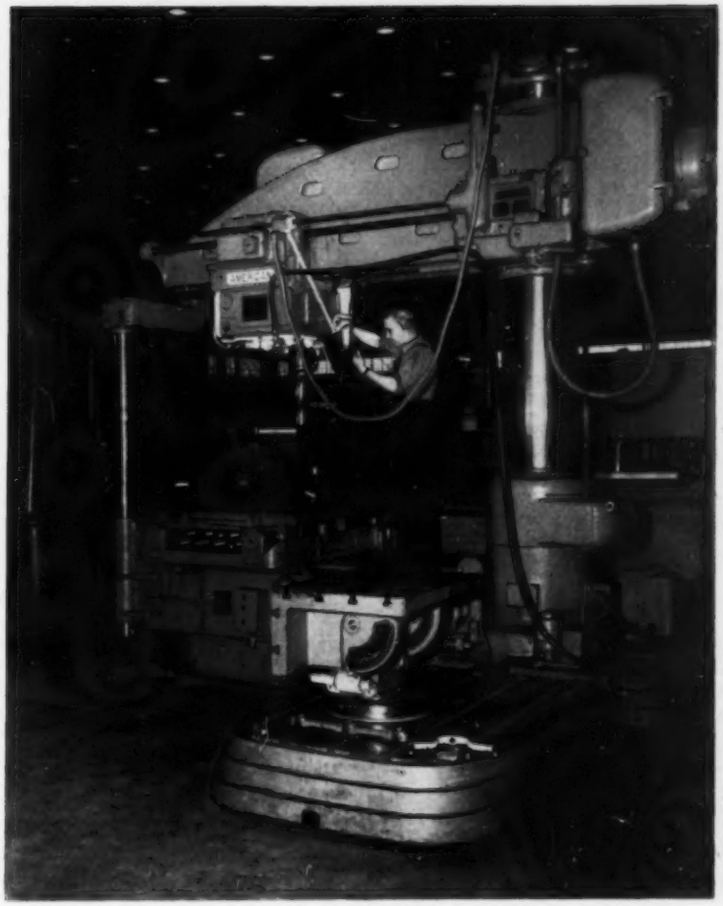
For a time after 1945, military aircraft production ceased entirely, the continuing needs of the RCAF being met by imports like the British-built Vampire jet and the propeller-driven shipboard fighters such as the Firefly, Seafire and Sea Fury. A few Mustang fighters and Lancaster bombers left over from World War II were also kept in service. But this was largely because the Canadian Government, convinced that jet aircraft were the military machines of the future, was taking a much longer view. To this end, and with British and American help, defence contracts were let for the purpose of developing gas turbines and gas-turbine-powered aircraft in this country.

Out of all this came the eminently successful Orenda jet engine, and the long range jet intercepter the CF-100. The Orenda, and its smaller predecessor the Chinook, are unique in that they were the first aircraft engines designed and developed for mass production here. The CF-100 was, similarly, a development venture, being designed specifically as a long range interceptor to be used in conjunction with the radar bases in Canada's northland.

Current Production Program

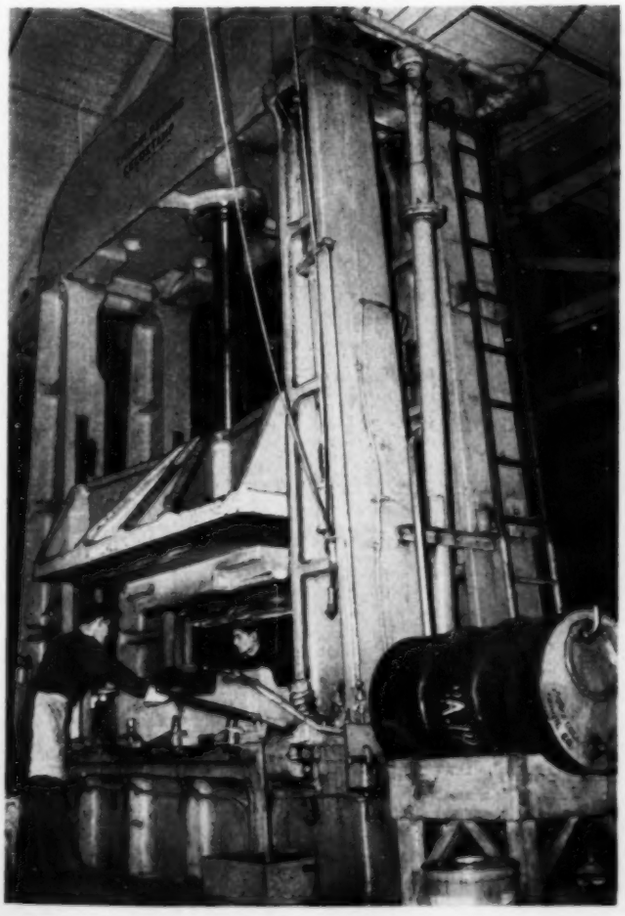
The outbreak of war in Korea once more transformed the outlook for this industry. The Government's defence budget was reshaped, and within a few months plans were laid down which have virtually remade this most versatile of Canadian industries. It was decided at the outset to concentrate on the manufacture of jet fighter and trainer aircraft. Also, it was decided to make North American type planes, engines, armament and other equipment. Strategy, including the need to secure supply lines in wartime, necessitated this. And, finally, it

The Aluminum Company of Canada's sheet rolling mill at Kingston, Ontario.

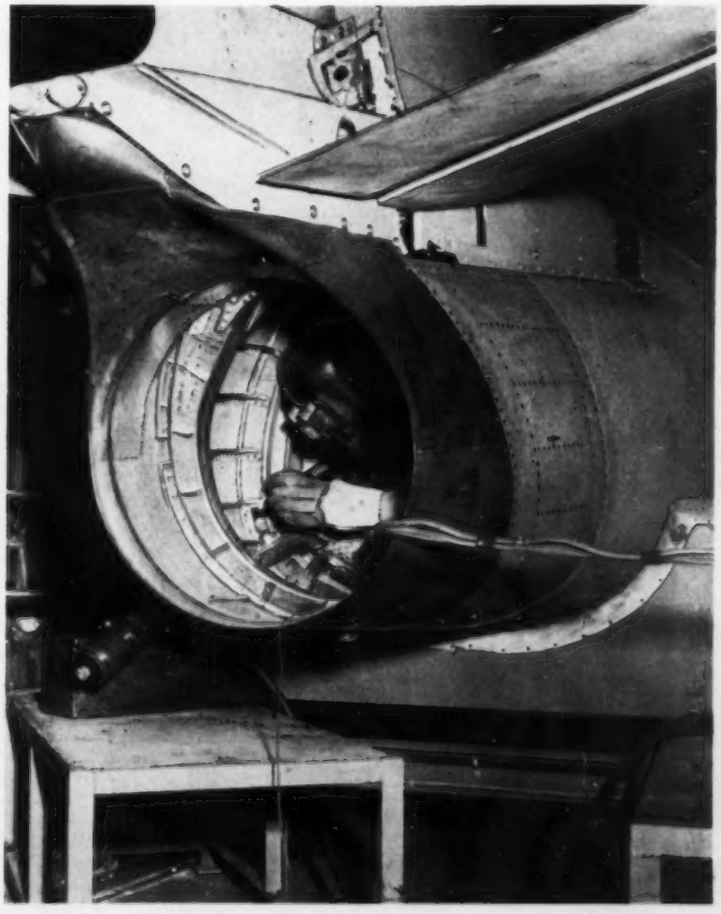


An example of a large radial drill.

A drop hammer at work stamping large metal parts for aircraft.



A welder at work in the rear fuselage of an F-86 Sabre jet.



A J-47 jet engine being installed in a U.S. Air Force Sabre jet.

was agreed that Canada would devote a large proportion of her defence budget to aircraft procurement.

As a result, activity in this industry has been rising steadily. Already employment has reached two-thirds of its World War II peak. Compared to the postwar low in 1948, the change has been nothing short of dramatic.

Mounting defence expenditures are, of course, largely responsible for this. Aircraft and related equipment, such as electronic gear, armament, ground handling machinery, etc., have reached the impressive level of over $450,000,000 a year. This is equivalent to about forty cents out of every Canadian defence procurement dollar, and to over ten cents out of every dollar which Canadians are presently paying to the federal government as taxes.

At the outset there was the need for new and much expanded production facilities. This meant more and specialized buildings, processes and machine tools, not only at the plants of the nation's principle aircraft and engine manufacturers, but also at the plants of subcontractors, many of which had to be established from the ground up. Several firms have come to Canada to make complete engines such as A. V. Roe Canada Limited, Canadian Pratt & Whitney Aircraft Company Limited, Rolls-Royce of Canada Limited and the Bristol Aeroplane Company of Canada. Theirs is the responsibility for the completed engines.

The biggest single phase in the Bristol Aeroplane Company of Canada plan for Canadian expansion during 1953, was the formal opening in November of its new Montreal North plant, featuring the most modern of overhaul and testing facilities in North America. Bristol comes to Canada to offer its extensive experience in aviation (founded in 1910) to a growing air power, and with determination to fulfil its share in the task of developing this field.[7]

These deficiencies were met partly out of the private resources of industry itself. But in other instances, and especially where no long term applications were in sight, the federal government had to provide the necessary capital; either that or allow fast tax write-offs against the defence contractors' operations.

[7] Typical of these new firms are: Canadian Steel Improvements Ltd., New Toronto, Ont. (gas turbine blade forging); Lucas Rotax Ltd. Scarborough, Ont. (high pressure fuel systems); Cockshutt Aircraft Ltd., Renfrew, Ont. (combustion chambers); Dowty Equipment Ltd., Ajax, Ont. (aircraft hydraulics); Sperry Gyroscope Ltd., Montreal, Que. (aircraft instruments); and H. I. Thompson Ltd. (thermal insulation blankets).

It takes more than plant and equipment to ensure that production schedules are met. Component parts and sub-assemblies have to be kept flowing in at the appropriate time. Take jet engines, for example. For a long time the rate of production of the Sabre fighter has been geared to the availability of jet engines, first from the United States and now from Canadian sources. Electronic gear and armament are other cases in point. Protracted deliveries of these latter items have similarly affected deliveries of the long range CF-100 jet-fighter.

But no one can blame the component suppliers for they, too, are confronted with parts and materials priorities and they, too, have had to contend with a mixed program of production and development.

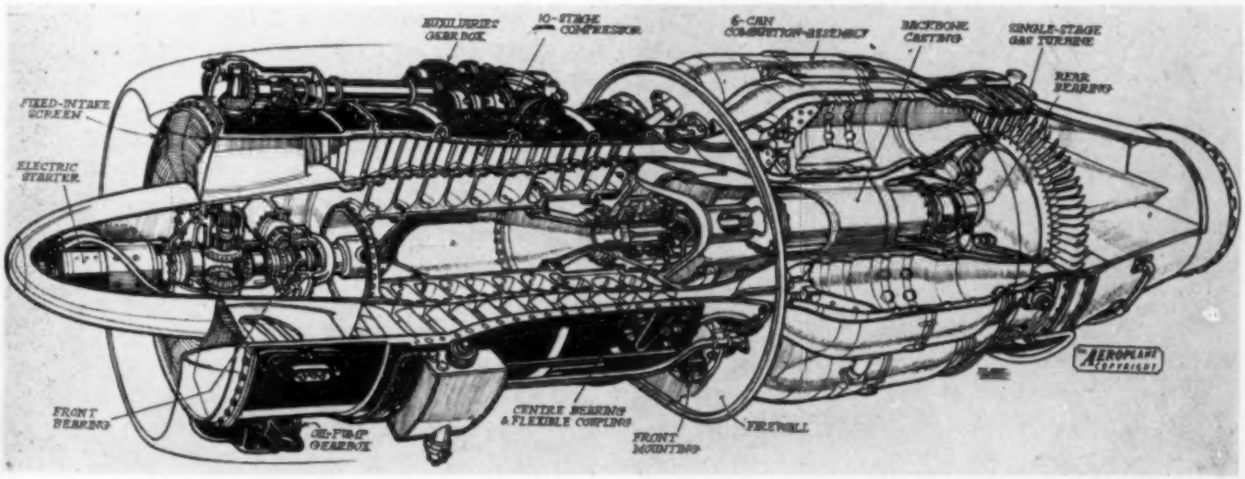
Sometimes it happens that some of these sub-contractors have a bigger job in this respect than the aircraft manufacturers they supply. As an illustration: the electronic gear they carry is at least as complicated as that of a modern television station. Sometimes a single firm has had to carry much of the load when it came to fire-control equipment or weapons. No wonder Canada's defence authorities have had to select carefully the fields in which Canadian industry has been asked to participate and to look elsewhere for some of the more elaborate types of equipment which are being installed in Canadian-built aircraft.

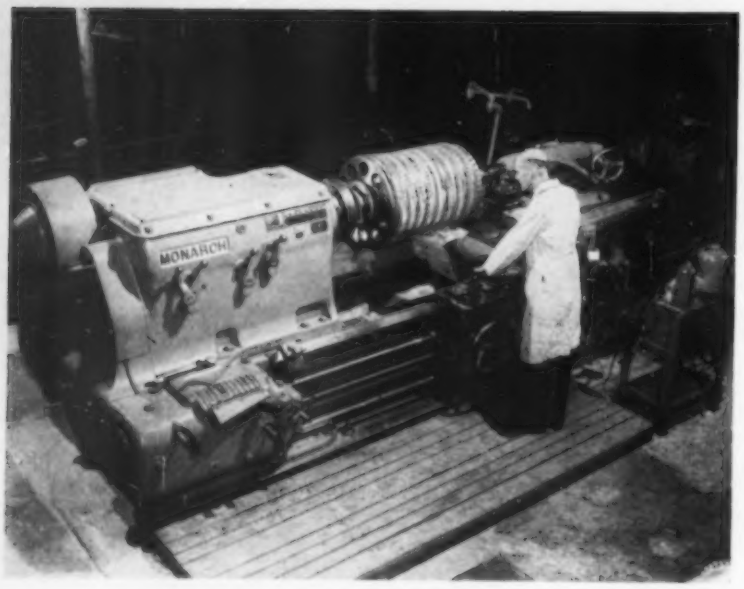
The aircraft industry proper has had development headaches too. It has had to recruit experienced design teams. Some of these people have had to be brought in from the United Kingdom and others from the United States. A sprinkling of technicians have also emigrated from continental Europe. All of these highly trained people, bringing with them new techniques and an abundance of experience, have helped to leaven and supplement the abilities of Canada's own native-born scientists and engineers.

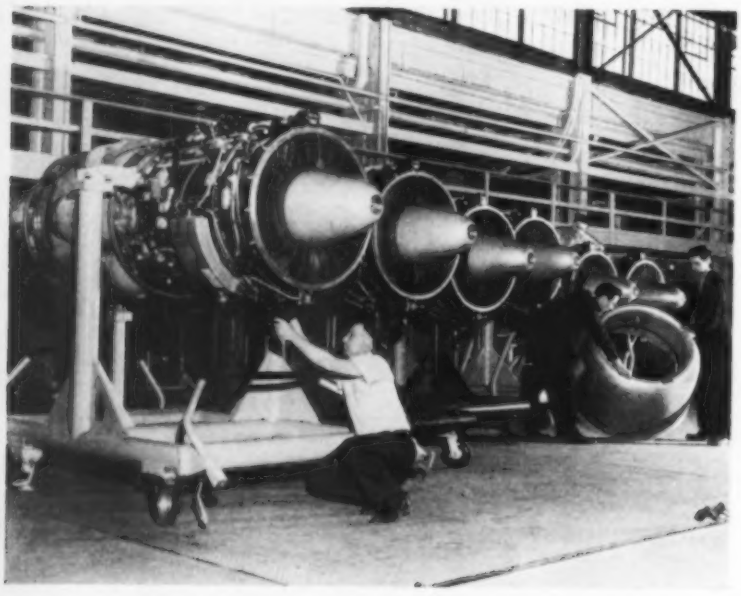
For a relatively young country, and one which at the same time has had to rebuild much of its basic aeroplane manufacturing capacity, the record has been an enviable one. The NATO countries, especially the recipients of Canadian Mutual Aid, have been loud in their praise of the speed and efficiency with which Canada has got into large scale production of the F-86 Sabre jet. The performance of Canadair, indeed, has been such as to invite contracts even from the United States, where this aircraft was designed and is still being built. The Orenda gas turbine development and production program must also be rated as a first-class performance. Not only is this engine among the several most powerful in production, bu

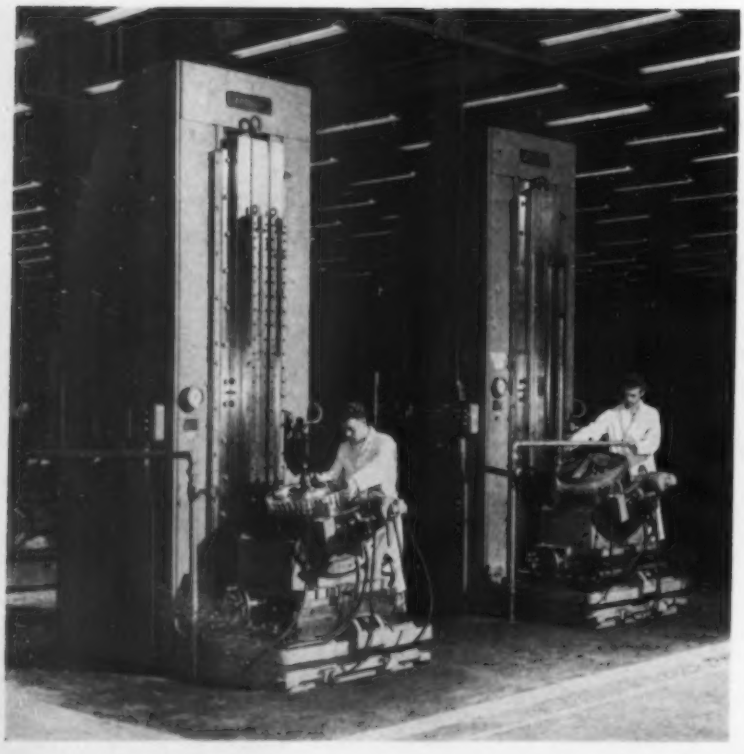
A sectional impression of the Avro Orenda jet engine now being built at Malton, Ontario.

Copyright drawing by courtesy of "The Aeroplane" (England)









it is now being manufactured in greater quantities than any other engine of comparable thrust in either the United Kingdom or the United States.

The development genius of the Canadian aircraft industry has received further recognition in the case of the de Havilland Beaver and the T-36 high speed training aircraft which was to be built at Canadair.[8] Both of these designs have won out in United States Army Air Force competitions. And its airframe manufacturing ability is also being demonstrated in the case of the Harvard T-6 single engine trainer, the T-34 single engine, low wing, tandem seat, monoplane, and the T-33, an adaption of the jet-propelled Lockheed Shooting Star. Like the Beaver, the first two are being built mainly on United States Government account, while the latter is needed in Canada for the RCAF Air Training Plan. The T-6 is used extensively in the training of the nine NATO nations in Canada.

Outlook for the Industry

What, one may ask, in view of the ups and downs which have already been encountered, is the outlook for Canada's aircraft industry? What are the chances of keeping these valuable skills and manufacturing capacity mobilized in the interests both of national defence and civilian applications? And, what, if anything, can be done to ensure that a nucleus of designers, engineers and skilled tradesmen is immediately available in the event of an emergency?

As far as near term work is concerned, the industry has not too much to worry about. Present defence contracts will keep most plants operating at or near today's level of output for several years. And, for a time after that, additional orders stemming from Canada's NATO obligations will help to fill any gaps which might otherwise appear in the industry's production schedules. Besides, government work should help in other ways. It will help by providing initial orders over which such charges as tooling can be amortized, and it can help by providing early production experience on

Profile turning of Orenda compressor rotor drum assembly.

Completed Orenda jet engines leaving the assembly line at Malton.

Broaching machines cutting blade-holding slots in Orenda compressor discs.

8 This contract was recently cancelled by the U.S. Government as part of its current economy drive.

basically civilian type aircraft. The industry by then may be competitive with foreign manufacturers who enjoy these and other forms of government assistance.

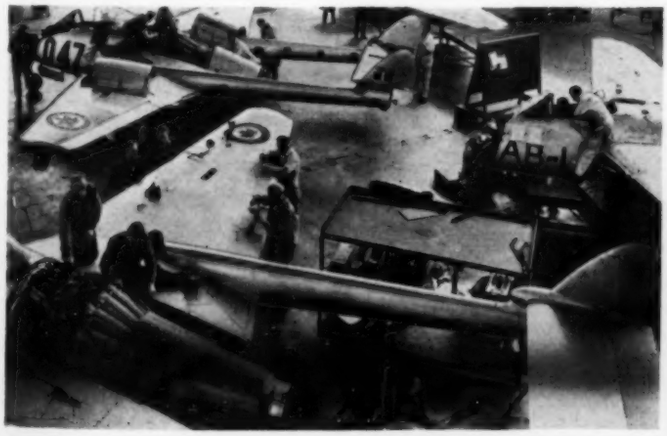
A growing volume of conversion and repair and overhaul work will also help to keep the industry busy. Indeed, it is only in the manufacture of civilian type aircraft, say after 1955 or 1956, that the outlook seems uncertain. In assessing this, one must remember that world conditions have changed appreciably in the last few years. Outside competition is growing stronger. Great Britain's lead in the field of jet and turbo prop airliners is well established, not only for technical reasons, but because of the much lower wage rates which prevail in the United Kingdom. The United States' lead in respect of light personal aircraft has been growing also, thanks to the size of the American market and the techniques of mass production and mass servicing which have been introduced there.

Possibly Canadians can capitalize on the fact that North Americanized versions of the more successful British aircraft may be in considerable demand even in the United States. Or the industry may corner the domestic market for some light plane or other. But, generally speaking, it looks as if the greatest opportunities lie in the in-between categories—that is, in the development and production of medium sized passenger and freight handling aircraft, or in manufacturing aircraft designed specifically to meet Canadian conditions.

To Canada's aircraft industry, this is nothing new. It is still confronted with a set of circumstances which sometimes call for compromise and sometimes for independent action. It must still go on capitalizing on the work of others before introducing new products of its own, and it must still go on importing many of its component parts. Its mainstay, too, is still the Canadian market, even though, through quality and efficiency, it may secure new export markets as well.

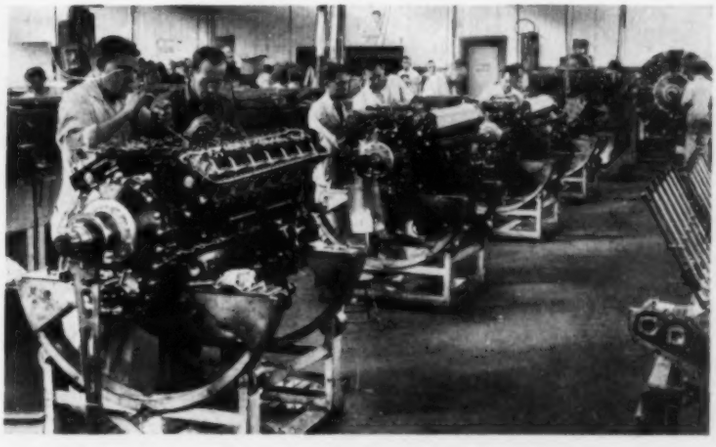
With aircraft becoming more complex, and with defence and other government contracts being by no means permanent, this is a real challenge; a challenge which calls for leadership, business acumen, and even more important, good sound common sense. There is little point in trying to compete with one or more of the world's leading manufacturers in their own chosen field. Nor, for that matter, is there any sense in promoting advanced engine or airframe designs, the manufacture of which calls for either specialized industrial technique or unique manufacturing facilities and skills which are either comparatively unknown, or cannot easily be duplicated in this country.

The answer appears to lie, as it has done in the past, in versatility and an ability to draw at short notice on the manufacturing capacity and the experience of predominantly civilian industries. This is in the tradition of the Canadian aircraft industry, and has been its real source of strength both in peace and in war.



R.C.A.F. Vampire jet fighters being overhauled at the de Havilland plant just outside Toronto.

Repair and maintenance plays an important part; here Rolls-Royce Merlin engines are being overhauled at the Bristol Aeroplane Company Limited plant at Montreal.



Canada and World Air Transport

by SIR WILLIAM P. HILDRED

THE SEATING of a Canadian as President of the International Air Transport Association last month for the second time in the short post-war history of the world airline organization has served to underline the fact that three institutions, whose influence on aviation is world-wide and persuasive, are located in Montreal.

The three have made the city under the mountain the capital of international aviation activity. In the order of their age and size they are the International Civil Aviation Organization, or ICAO (also known in French and Spanish as OACI); the International Air Transport Association (IATA in all languages); and the Institute of International Air Law at McGill University.

ICAO and IATA can best be distinguished as the world organizations of governments, or regulators (ICAO), and of airlines or operators (IATA). The Institute, as its name implies, is devoted to training and research in air law.

All three agencies are products of the increasing and now imperative necessity for the organization of air transport affairs on an almost universal basis. They are themselves symbols of the impact of aviation on modern life, by speeding up the world's affairs and shrinking its distances to the point where the globe has become a single neighbourhood.

The presence of all three in Canada is also a recognition on the part of other nations of the place which Canada occupies as a bridge between the old world and the new, in terms both of geography and of human affairs. ICAO exists by virtue of the Chicago Convention which was signed by the States of the United Nations in late 1944; and it was at Chicago that Montreal was chosen as the proper site for the Provisional International Civil Aviation Organization which has since acquired permanent status. IATA, which was formed as a result of consultation of airline operators at the same Conference, chose Montreal in order to be close to ICAO. The Institute was, in a sense, a natural development of their existence, and of the facilities offered by McGill University at Montreal.

While the functions and the approaches of the three organizations may differ from time to time, their basic objectives are very much the same. All of them are attempting to set high common standards for the operation of air transport and other forms of aviation throughout the world; and to reduce, where they cannot completely eliminate, discrepancies between languages, currencies, systems of law, commercial practice and even states of mind which hinder the exploitation of aviation as a public utility for the peoples of the entire world.

ICAO

As the organization of governments, ICAO is mainly concerned with the setting up of standards and recommended practices for regulations which are implemented by 51 individual states which are its members. An affiliate of the United Nations and one of its technical agencies, ICAO has its own General Assembly as the source of all authority. Its deliberations are carried on in a 21-nation Council over which Dr. Edward Warner, a distinguished American engineer and public servant has presided since 1945. Under the Council are an Air Navigation Commission, which is concerned with the more technical and operational aspects of aeronautical regulation; an Air Transport Commission, which deals with economic matters; and a Legal Committee, which is concerned with international conventions in public law.

In addition to this structure, ICAO also maintains a Joint Support program through which the nations join in providing necessary facilities for aviation where they cannot be locally financed or maintained; and a Technical Assistance program which looks after the aviation phases of the United Nations effort to aid underdeveloped countries throughout the world.

While ICAO's working meetings, like its interests and objectives, are likely to be found almost anywhere on the map at any given time Montreal has been the power house of a tre-

mendous and signally successful standardization of aviation regulation and facilities throughout the world. As a result of its local and regional activities, ICAO has produced 16 annexes to its convention, by which the procedures and practices of 61 governments in regard to every phase of aviation — from licensing of personnel to the installation of facilities, and the operation of aircraft — have been covered in detail. These annexes are, in every sense of the word, full multilateral international agreements, and they represent the conclusion of highly complex and occasionally highly controversial international treaties at the rate of one every five months!

This legislative function is continuous, because the changes and improvements in aeronautics from which it springs, and which it must attempt to keep within the proper channels, are also continuous. And with the building of the primary structure of the annexes, ICAO has also undertaken a second function which is to encourage its member governments to implement its standards and recommendations to the fullest possible extent. Where local governments cannot do so out of their own resources, ICAO has also arranged to meet the deficiencies by international collaboration: such action has resulted in the installation and maintenance of Loran stations in Iceland, and the Faeroe Islands, weather ships in the North Atlantic, and telecommunications and weather stations in Greenland.

In addition, ICAO Technical Assistance missions have been or are active in some 30 countries and 100 young men and women have been provided with fellowships for study in various phases of aeronautics or have been brought to Montreal as trainees in ICAO itself.

IATA

IATA, which last month seated Gordon R. McGregor, President of Trans-Canada Airlines, as its own ninth President, has an even more Canadian flavour because as a private international organization it exists legally by virtue of an Act by the Canadian Parliament. It is, nevertheless, as completely international as ICAO, for its membership is comprised of approximately 70 companies flying the flags of more than 40 nations and carrying 95 per cent of the world's international air traffic.

In an important part of its work, IATA is also a quasi-public organization because it discharges certain functions — the recommendation of international rates, fares and conditions of carriage — under the terms of a large number of bilateral agreements between States.

In functional terms, IATA is the agency through which the world's airline operators seek joint solutions to the numerous and varied problems of flying and doing business at the international level. It represents their joint views in other international agencies and provides the framework for co-operation between airlines themselves and with individual governments or groups of States in a host of specific projects. It administers their efforts to standardize, simplify and unify practices and procedures wherever desirable in both technical and commercial fields. It conducts an international Clearing House at London for the settlement of interline transactions and acts as the agent of the airlines in the publication of consolidated tariffs and other basic transport publications. IATA also administers the IATA Traffic Conferences, semi-autonomous bodies concerned with international rates and fares, conditions of carriage and agency matters, and enforces Conference resolutions after they have been made effective by government approvals. In short, IATA is to the airlines their international maid of all work.

Any airline which is certificated to render scheduled transport by a government eligible for membership in ICAO is automatically eligible for membership in IATA, and in the basic source of authority in IATA, the Annual General Meeting, each member airline, regardless of size, has but one vote. Except in the Traffic Conferences, the members of IATA committees and working groups serve on behalf of the entire industry, rather than as spokesmen for their own principals. Decisions of any importance which are to be held binding upon members must be arrived at by unanimous vote and often after the scrutiny and approval of interested governments.

The year-round direction of IATA is entrusted to an 18 member Executive Committee elected by the General Meeting, and IATA's affairs are administered under a Director

General, and a secretariat of approximately 120 persons. These are scattered between the head office in Montreal and branches at New York, London, Paris and Singapore which serve as headquarters for the three IATA Traffic Conferences and the IATA Clearing House and Consolidated Tariffs.

To a very large extent, the creative activity of IATA is based upon the willingness of its members to share with one another the benefit of their accumulated knowledge and experience in any given phase of air transport operations. IATA's accomplishments have been as many as its terms of reference are varied. The list of them, however, can be compressed into the statement that through IATA the 600,000 miles of routes of the individual airlines have been welded together into what, so far as the passenger and the shipper of freight are concerned, is a single transport network along which he will find everywhere the same rates, the same standards of operation, the same ethics of commercial conduct and the same standard of service.

A particular effort of both organizations has been the campaign to reduce the red tape of customs, immigration, and currency controls, which hamper the free movement of aircraft, passengers and freight across international boundaries.

Institute of International Air Law

Any international co-operation must be based on international law and order. The role of the Institute of International Air Law has been to train young men and women who hold ordinary degrees in law in a field of increasing importance and world wide significance. Organized by McGill University to fill a need in the legal and academic world and to contribute to the general development to the subject of air law by the creation of a centre for reference and research. The Institute is headed by Prof. John Cobb Cooper, a distinguished American scholar and lawyer and who has been active in air law affairs for more than a quarter of a century.

Now in the third year of its existence, the Air Law Institute has trained graduates of universities of Australia, Canada, Ceylon, China, Colombia, Egypt, Germany, Great Britain, France, Greece, Hungary, Italy, New Zealand, and the United States. It has also encouraged them to do research into the gaps and discrepancies of what the other international organizations hope to create and what Professor Cooper has called "the universal system of sound legal rules that will be applicable to every aircraft, no matter what may be its nationality or where it may fly". In short, it is a clinic in comparative air law, where questions may be treated from a scholarly and scientific point of view as a complement to their consideration by ICAO, as a regulatory agency, or IATA, as an organization of operators.

The three agencies are, as the world measures time, comparatively young. IATA and ICAO draw their roots from organizations which existed before the last war, but which have emerged from that conflict into the wider spaces of Canada facing far wider challenges and responsibilities. The activities of all three have had, in a sense, to begin afresh during the past eight years, and to adapt international machinery to one of the world's newest and first completely international activity.

Whilst those activities have found their expression in a host of detailed and complex agreements, their true significance may very well lie in the spirit and the machinery of international co-operation in the interest of a world public which they have erected.

These achievements of aviation, as they have become evident in Canada, were summed up last month by the Prime Minister, the Rt. Hon. Louis St. Laurent, in an address to the General Meeting of IATA which could equally have been directed to ICAO and the Institute. He said:

"In this age of air travel and steadily diminishing distances, the nations of the world can no longer afford the luxury of hatred or even indifference towards other nations.

"You have demonstrated that fact by working for and bringing about ever increasing international harmony and co-operation among the air transport companies of the world. You are encouraging those of us who have responsibility for the government of our nations to realize that complex international problems can be solved and that given good will and a community of interest, mutually helpful agreements are possible . . . No contribution toward international harmony could be greater than the encouragement set by your example."

An episode in the Ramayana ballet. A holy Rishi (centre), protecting Hanuman, the white monkey (left), from the wrath of the demon king Ravana, whose teacher Rishi once was.

Photographs Baron from Miller

The Dancers of Thailand

by BARON

LITTLE IS KNOWN in the western world about the ancient and beautiful dance traditions of Thailand, the kingdom in Southeast Asia formerly known as Siam. Dancers from India and from Indonesia have performed in the West, but the Indonesians are neither so stylized nor so picturesque as the Thai dancers. This is partly, I think, because of the very costly, fantastically colourful, bejewelled costumes worn by the latter. To wear them properly requires skill and knowledge.

I was fortunate when visiting Thailand with my friend, Prince Chula Chakrabongse, in being the guest of this high and mighty prince. Through his influence the Siamese National Ballet Company gave a special performance and also agreed to pose in full costume in the open air so that I could obtain a unique collection of pictures of the famous Khone traditional dance.

According to most authorities, the classical ballet reached the Indo-Chinese peninsula about 300 B.C. It was then, as it is today,

Two famous Thai dancers who usually take the parts of Ravana (left) and Hanuman, the white monkey, the two principal parts in the epic of the Ramayana.

mainly religious in character and was brought over by Brahmin missionaries in those far-off times. Today the Cambodians, the Burmese, the Indo-Chinese and the Siamese have split the original foundation and each has dances and costumes which can be termed its own, although the basic idiom remains the same. Particularly in Thailand, the dance is an essential and traditional accompaniment to many important ceremonies, more especially in connection with the Court.

The Siamese Ballet itself flourished under the rule of Generak Chakri, ancestor of Prince Chula and the first king of a new dynasty founded in 1782. Until 1932, when the absolute monarchy was replaced by the constitutional rule which now exists in Thailand, the ballet was centred in the Royal Palace. In the reign of King Vajiravudh (1910-1925) there was a department of the Royal Male Ballet financed entirely by the King, with several hundred performers. What you see in the pictures here is exactly the same as that which was created in the late eighteenth century, and practically the same as it had been for several hundred years before that.

The demon king, Ravana, in one of the classical poses from the Ramayana. His mask has nine faces, the top face resembling Brahma, to denote his godly descent.

The Thai ballet is largely stylized and any alteration from the original steps, music and costumes is rare and a matter for high level discussion. My own view is that in these days the ballets tend to be too long and could be improved by cutting and quickening of pace. There is a great deal of repetition both in the steps themselves and in the music and poetry to which they are danced. Prince Chula told me that one great epic which he witnessed as a child, the romantic tragedy, Khun Chang-Khun Pan, performed in its entirety for his grandmother at the Summer Palace of Bang-Pa-In, took more than sixty nights, each performance beginning at 9 p.m. and finishing at 2 a.m. Admittedly the King and Princes and courtiers who witnessed this marathon performance permitted themselves to go in and out of the room, indulge in private conversation and consume exotic delicacies. All through this the chanting of the poetry and the dancing and the music went on. It must have been an enormous strain on the dancers themselves since nearly all of them wore masks of plaster and wood, and in the terrific heat of the tropics it requires a strong constitution to keep up an exacting routine.

Ravana watching his niece, who is disguised as the Princess Sita, wife of Prince Rama, a god who has become human. Sita has been abducted by the demons, led by Ravana.

What must be remembered in order to appreciate it to the full is that every movement in the dance is a development of a story chanted in the form of poetry by a singer. Thus those without a knowledge of the language can only understand the movements and the effective mime which the leading dancers are able to put over in a quite extraordinary manner despite the fact that they are wearing masks. A shake of the head, the angle of the head, the poise of the neck and shoulders, the subtle, graceful curves of the arms and particularly of the fingers — which can be bent back almost to touch the wrist — each have different meanings which even a Westerner can begin to appreciate after a while.

The pictures you see here denote phases in the Ramayana which is an epic of the war between a god become human (Prince Rama) supported by an army of semi-divine monkeys, against the demons, led by Ravana, who had abducted Rama's wife Sita. The principal dancers are the Demon King Ravana, who has ten faces depicted on his mask, and the white monkey, Hanuman, also masked. Amongst the males all but the two human princes wear masks

Prince Rama conquering Ravana, watched by his brother and Hanuman. The two princes, being human, wear no masks, the only dancers besides the women to appear unmasked.

and this never varies, although the Princess Sita and other girls in the caste do not wear them. In the days of the absolute monarchy, all the dancers in the Khone ballet were men, even those taking the feminine roles, but in present-day Thailand, with its constitutional monarchy, the ballet is run by the Department of Fine Arts and has followed the modern trend so that all the female characters are now danced by women.

An interesting point is that although the original dances were founded on the Brahmin cult, the prevalent religion in Siam today, which is Buddhism, admits of no dancing in its ritual. The traditional stories are based on legends essentially religious in character but the dancing itself has no part whatever in religious observances. I was very anxious to obtain a background for the dancers of one of the famous and beautiful temples which I saw in Bangkok, but as dancing was forbidden in temples this was not possible. The pictures you see here were taken against the background of the museum which, although a good example of ancient Thai architecture, cannot compare with the glories of some of the other buildings.

The success of the cattle industry is largely due to carefully chosen grazing grounds. Here cattle are being herded across the Oldman river near Fort Macleod in the drive to winter grazing grounds.

An Economic View of Alberta

by RALPH R. MOORE

Alberta Government photographs

ALBERTA offers an interesting study of an economy in transition. Geographically suited to be a major producer of food, for a long time Alberta drew its main economic sustenance from the agricultural industry alone. But the swift development of natural resources, the advance in technical knowledge and the pioneering drive of Canadian business have brought industry to this farm province, making the economy more diversified and flexible.

Alberta's manufacturing industries, which produced $5,000,000 worth of goods in 1906, the first year in the province's history, are now producing approximately $500,000,000 worth of goods and materials each year. In the forty-seven years since the Province of Alberta came into being, the number of manufacturing plants has grown from 97 to nearly 2,000. There are 27,000 persons employed by Alberta's manufacturing industries and their salaries and wages approximate $60,000,000 annually.

A woollen mill, established at Midnapore,

south of Calgary, in 1883, probably was Alberta's first manufacturing concern. It came as a result of an amazing trek by an English couple who purchased thirty tons of machinery in the Old Country and brought it to Calgary on the first freight train to reach Alberta on 11 August, 1883. The daring experiment succeeded and the mill prospered for more than thirty-five years.

The coming of the railways was the spark which lit the fuse of industry in the province. The track-laying crews needed food; good red beef was the food for men who had achieved the memorable record of laying a mile of track in an hour. This laid the foundation of a meat-packing industry as beef contractors supplied the railway crews with beef from Alberta ranches.

A system of communications was developed by the railways and soon the modest industries springing up in the cities were linked by steel with markets and sources of supply. The main raw materials—cattle and grain—dictated the type of early industries. The first manufacturing was based on businesses utilizing farm products as raw materials and others supplying the farming population with goods, implements and supplies.

Vegetable and animal products still dominate the galaxy of manufacturing industries, providing about 67 per cent of the total value of manufacturing production each year. Included in this are flour and feed mills, bakeries, breweries, cereal factories, vegetable canning factories, sugar refineries, creameries, cheese factories, a milk condensery, tanneries, slaughtering and meat packing plants and the manufacture of fruit and vegetable preparations, soft drinks, leather goods, footwear, and fur goods.

Supporting the manufacture of vegetable and animal products is agriculture, the province's main economic activity. From a total area of occupied farmland of 44,459,632 acres and a farm population of 339,955, the gross value of agricultural production in 1952 was $767,108,000. Field crops contributed $559,644,000 to this total, while livestock and livestock products yielded $207,464,000.

The larger part of the lands seeded to cereal crops carry wheat. Each year, approximately 7,000,000 acres are devoted to wheat while 5,050,000 acres are in coarse grains. Most of the wheat grown in Alberta is the hard red spring type used for making bread flour. Closely following wheat are oats, barley and rye. Small parts of the annual oat crop are milled to make rolled oats or sold for seed in Canada and the United States, while more than 8,000,000 bushels of Alberta barley are used each year for malting.

Flour and meal, breakfast foods, barley, stock and poultry feeds, bran and other grain products are produced in the approximately 120 flour and feed mills in the

Vast grain crops are rich proof of the province's main economic activity. A bounteous harvest reaped at a farm near Manning, northern Alberta.

province. The 60 flour and feed mills on which there are statistics available, have an annual production amounting to $42,000,000. There are 31 flour mills in the province with a total capacity of 17,435 barrels a day.

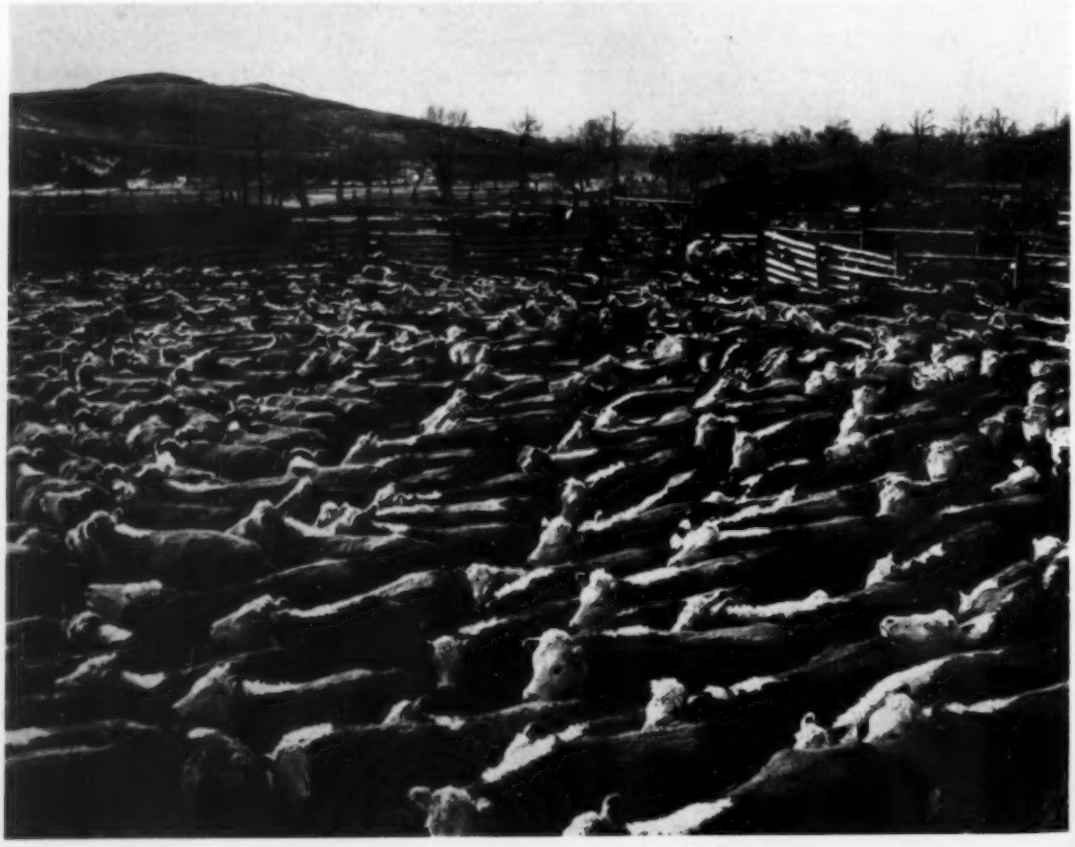
A cereal plant at Calgary makes rolled oats, oatmeal, and pot and pearl barley while another mill at Camrose manufactures a porridge cereal and a pancake flour which are sold throughout the four western provinces. The largest flour mill in western Canada is Renown Mills at Calgary, which has a capacity of 5,100 barrels a day. This mill, which is one of the best equipped in North America, divides its production into domestic and export markets. Its flour is sold to many countries including Great Britain, Norway, Switzerland, Italy, Lebanon, Syria, India, Ceylon, the Philippine Islands, Japan, the British West Indies and several countries of Central and South America.

Part of Alberta's annual production of flax seed, which in 1952 totalled more than 2,000,000 bushels, is used to produce linseed oil and linseed oil cake and meal at a plant at Medicine Hat. This plant, the largest in western Canada, has a capacity of 1,650,000 gallons of linseed oil and 12,000 tons of oil-cake meal annually. A local market for malt barley exists in five breweries and a malting plant at Calgary which has a capacity of 4,200 bushels a day.

The meat packing, dairy products, and leather industries also originated with agriculture. These activities, founded upon animal products, began with a cheese factory at Springbank near Calgary, in 1888, the first creamery at Big Hill Spring, north of Cochrane, in 1890, and the first slaughtering and meat packing plant at Calgary in 1891.

Livestock production during 1952 had a total value of $133,434,000. British Columbia is the best market for Alberta cattle and calves although a considerable number are shipped annually to Quebec, Ontario, Manitoba and Saskatchewan. The cattle export market was at its highest in 1936 when 317,054 cattle and calves were exported, 81,785 to the United States. Ontario provides the best market for Alberta sheep and British Columbia for swine, although large shipments go to Manitoba and Saskatchewan.

The meat packing industry plays an important part in Alberta's economy. During 1952, the 15 Alberta meat packing plants



The crowded corral at Bar-U ranch, near High River provides a small sample of Alberta's wealth in her livestock products industry, worth more than two hundred million dollars.

and slaughterhouses had a total production value of $105,000,000 and employed more than 3,000 people with an annual payroll of $8,600,000. During World War II, Alberta packing plants produced approximately 500,000,000 pounds of meat a year. Chief products of the industry are beef, mutton, lamb, pork, veal, poultry, sausages, cooked and canned meats, mincemeat, lard, shortening, tallow, vegetable and other oils, stock and poultry foods, hides, hair and fertilizer. British Columbia, Quebec and Saskatchewan are the best Canadian customers for Alberta meat. The Calgary livestock yards are the third largest in Canada and Calgary is proud of its annual bull sale, the greatest in Canada.

Dairy products form another important industry linked with livestock. More than 300,000 milch cows supply milk and cream to 111 butter and cheese factories which in peak years produce 38,650,000 pounds of creamery butter and nearly 4,000,000 pounds of factory cheese. In 1952, the value of dairy production was $37,000,000; 28,000,000 pounds of butter and 2,022,000 pounds of cheese were produced. Besides butter and cheese, the dairy plants produce fluid milk and cream, ice cream, evaporated milk, cottage cheese and powdered milk. An important plant is a milk condensery at Red Deer which in 1952 produced 16,500,000 pounds of condensed milk. British Columbia is the big market for Alberta butter and cheese although much butter is marketed in Montreal and much cheese in Saskatchewan.

Other industries related to livestock produce leather goods and animal foods. The leather products business is small, totalling 12 establishments with a $300,000 value of production during 1952, but it is working actively to increase the size of its market. There are four tanneries which produce harness leather and tan hides and eight other plants manufacturing miscellaneous goods. The latter produce harnesses, stock saddles, riding gear, dog collars, sporting goods, briefcases and luggage, and handsome hand-tooled belts which are sold throughout the West.

The animal foods industry, located in Calgary, consists of two plants which produce pet foods and food for the fur farming industry. Both plants ship their products throughout British Columbia, Alberta, Saskatchewan and Manitoba.

There are a number of special crops grown in Alberta, each of which supports a flourishing industry. On the irrigated areas

Long lines of freight cars fill the yards of the Canadian Pacific Railway at Calgary, an important distribution centre serving a district famed for ranching and general farming.

of southern Alberta, sugar beets and vegetables are grown on lands formerly regarded as useless for cultivation. There are now 15 major irrigation projects in operation containing a total irrigable area of 724,000 acres. When the St. Mary and Milk River Development project is completed, another 345,000 acres will be added to the total already under irrigation.

One of the most important of these special irrigation crops is the sugar beet. Starting in 1925 with a value of $37,000, the worth of the yearly sugar beet crop has grown until it reached $7,200,000 in 1952. Sugar refineries at Raymond, Picture Butte and Taber manufacture beet sugar, beet pulp and beet molasses (a by-product for feeding stock). Capacities of the refineries are: Raymond, 1,000 to 1,200 tons of sugar beets daily; Picture Butte, 1,200 to 1,400 tons a day; and Taber, 1,500 to 1,700 tons per day.

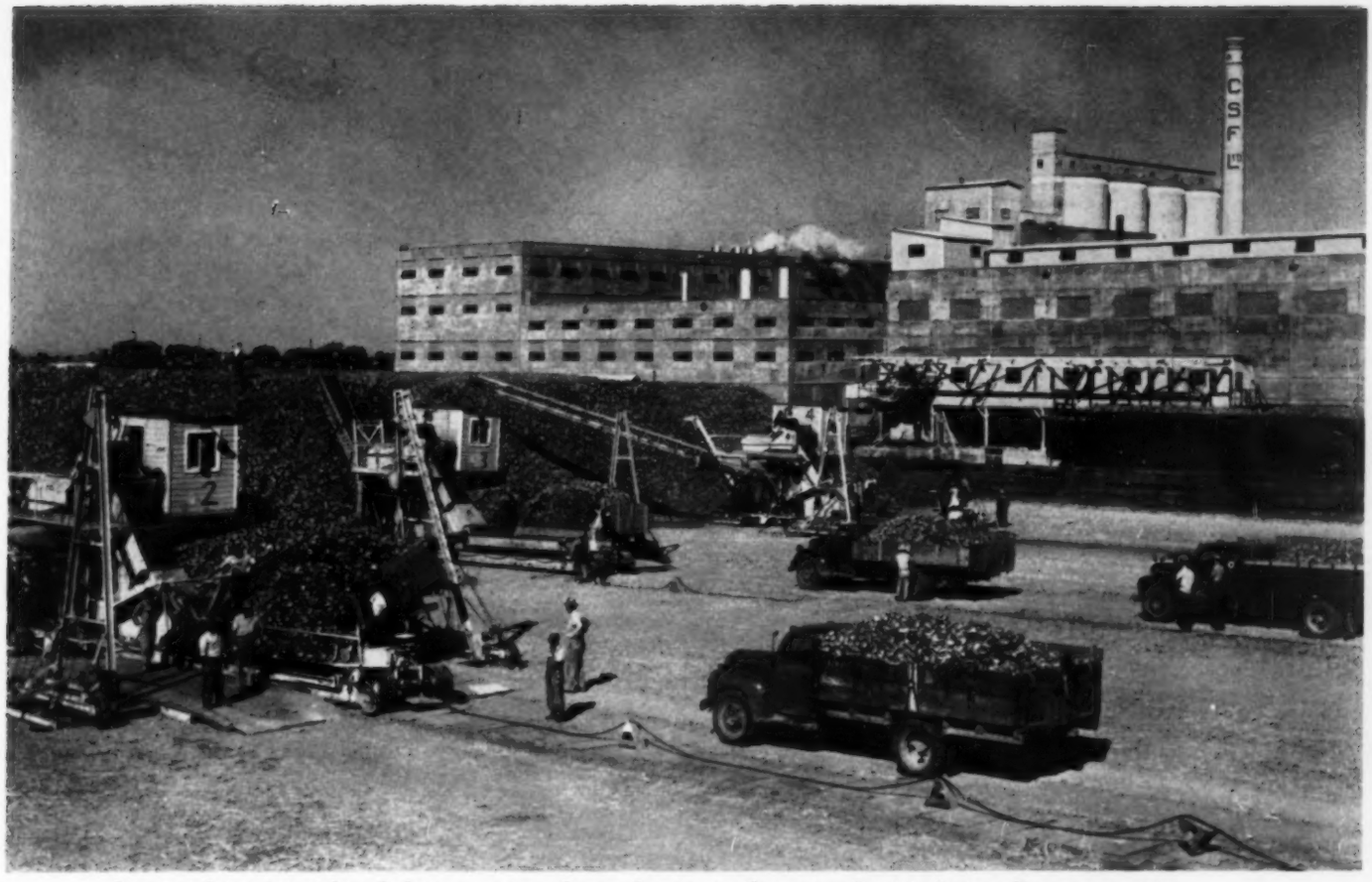
Irrigation also has encouraged a number of other special crops. Potatoes are grown extensively with the 1952 crop totalling 3,256,000 bushels valued at $4,884,000. Small quantities of mustard seed are grown and shipped to the United States for use in mustard spreads, pickles and salad dressings. Approximately 25,000 acres of mustard seed were sown in 1953.

Peas, corn, beans, carrots, cabbage, beets, cauliflower, lettuce, onions, pumpkins and tomatoes are also grown and canned in plants at Lethbridge, Coaldale, Taber, Magrath and Brooks. In 1952, the total value of canned vegetables produced was $750,000 but the industry's future is limitless. Spaghetti and macaroni are produced at a Lethbridge plant.

Since 1924, the quantity and value of Alberta's annual honey production has increased more than a hundred times and in 1946 Alberta was the largest honey producing province in Canada. About 50,000 colonies of honey bees are kept in the province, producing annually about 5,000,000 pounds of honey—enough to fill 200 railroad cars.

Since pioneer days, fur has contributed substantially to the economic development of Alberta. During 1952, wild fur production totalled 2,065,427 pelts valued at $1,765,849 while 975 fur farms produced 152,232 pelts valued at $2,726,527. Wild pelts include mink, beaver, badger, ermine, fox, lynx, marten, muskrat, otter, rabbit, skunk, coyote and wolf. Most of these furs are sent to the United States or eastern Canada but eight local establishments use

Agriculture is basic in Alberta's economic growth and each year sees more than seven million acres sown to wheat. Self propelled combines, shown below, are becoming increasingly important at harvest time.



Improved irrigation has led to an astounding advance in the sugar beet industry. Scene near the refineries at harvest time in Lethbridge District.

Alberta fur for trimming, repairs and small-scale manufacture.

Fur-bearing animals successfully raised on Alberta fur farms in order of their popularity are mink, chinchilla, fox, marten, fisher, nutria, fitch and rabbits. The number of mink raised far exceeds the total number of all other types of fur-bearing animals.

There are approximately 1,000 mink ranches, producing about 221,000 mink a year. Mink breeding stock is exported to the U.S., Sweden, Denmark and Great Britain and the increasing demand for Alberta ranch-raised mink is encouraging for the future of this important industry.

Thirty-four Alberta plants manufacture textiles and textile products but most of the textile articles sold in the province are imported. These plants produced goods worth $7,500,000 in 1952 and employ 1,000 persons at an annual payroll of $1,800,000. The clothing factories are the most important branch of the textile industry, producing a variety of styles in men's and women's clothing. In Edmonton and Calgary plants are manufacturing work clothing and sports dresses which are sold across Canada and exported to several foreign countries. New clothing plants are being successfully established, producing sports shirts, slacks and jackets for the western Canada market.

Alberta cannot yet be considered an important producer of wood and paper products but there is a vast potential forest products industry. Forested lands occupy approximately half of the province's area but of these 130,620 square miles only 60,000 square miles carry timber of merchantable size. Statistics as to the extent of Alberta's forest wealth are far from complete. The Department of Lands and Forests has been busy since 1949 carrying out an inventory of the province's forest reserves which by 1956 will yield accurate information on the amount of merchantable timber.

Tentative estimates of the amount of com-

Alberta furs, both wild and ranch raised, are famed throughout North America for their quality. They are of great variety, including beaver, mink, bear, muskrat, fox, lynx, marten, coyote, and wolf.

mercial timber reserves are 11,700,000,000 board feet of softwood and 5,200,000,000 board feet of hardwood. In addition there are 247,800,000 cords suitable for pulpwood, fuel, mining timber, railway ties and posts.

In 1952, there were 1,000 sawmills operating in Alberta and 400,000,000 board feet of lumber, worth a total of $16,000,000 were produced. Approximately 8,000 persons are employed annually by the lumber industry.

In addition to the sawmills, approximately 50 planing mills and 7 box factories are supported by the lumber industry. There are more than 35 furniture plants.

Alberta's commercial fishing industry, like its forest industry, as yet cannot compare in production with the fisheries of British Columbia or the eastern Maritime Provinces. Yet, during 1952, 9,656,981 pounds of fish valued at $942,888 were produced—the largest catch in four years.

A total of 1,905,672 pounds was exported to U.S. markets in the 1951-52 season while 45,250 pounds were shipped to Canadian markets outside Alberta. Whitefish is the most popular market fish, providing 80 per cent of domestic and export sales. Pickerel is next in popularity for the U.S. market with pike second choice for Canadians. Perch, trout, tullibee and suckers are exported also. Equipment worth a total of $400,000 is used by Alberta's commercial fishing industry, which employs 5,200 persons at the peak of the season.

The province's mineral resources are of great current and future significance to the economy. Although the annual total value of production for the entire mineral industry for 1952 was $197,333,166 compared with more than $767,000,000 for the agricultural industry, the mineral industry is rapidly forging its way ahead and very possibly may one day be the foremost industry in Alberta.

Greatest of the mineral industries are oil and natural gas which have grown from small localized activities to important factors in the world's oil market. In 1952, 59,000,000 barrels of crude oil valued at $140,000,000 were produced by 3,312 producing oil wells. Natural gas production for the year was 96 billion cubic feet, valued at $4,800,000.

More than 95 per cent of Canada's petroleum production is provided by Alberta, and oil reserves are estimated at well over 1½ billion barrels. Approximately one-third of the crude oil produced goes to the 12 Alberta refineries which have an annual production of 685,000,000 gallons of oil and gasoline.

The remainder of Alberta's crude oil production is transported to Sarnia, Ontario, refineries through the 1,129-mile-long Interprovincial Pipeline running from Redwater, Alberta to Superior, Wisconsin, at the head of the Great Lakes. From Superior, the oil is shipped by tanker to Ontario, but an extension now being completed from Superior to Sarnia will increase the pipeline's length to 1,765 miles and make it the longest in the world. The new line will have an ultimate capacity of 300,000 barrels a day while the U.S. market at Superior will take 100,000 barrels daily.

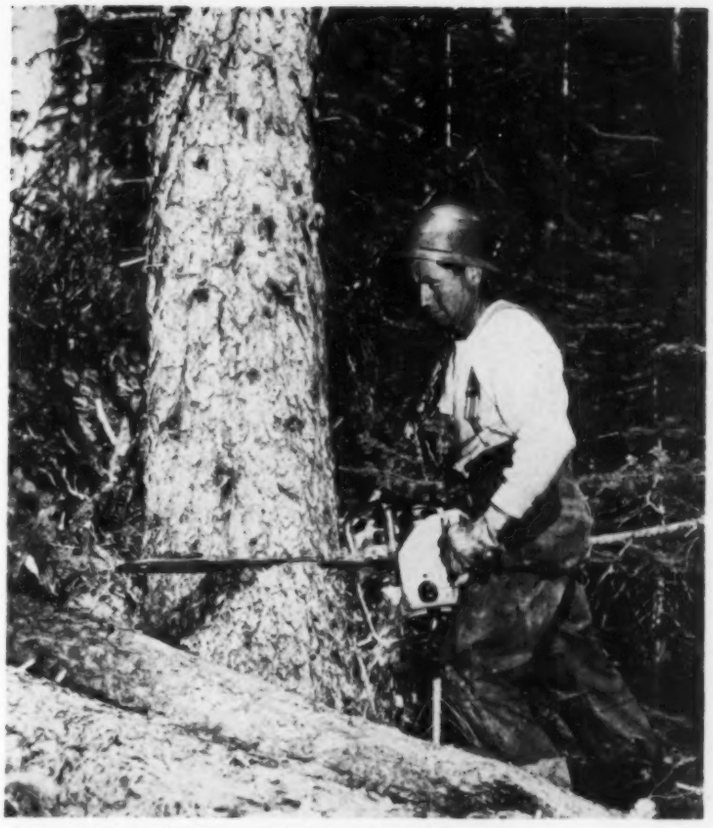
Another pipeline, 711 miles long, from

Edmonton to Vancouver has just been completed. This line, known as the Trans-Mountain Pipeline, has an initial capacity of 120,000 barrels a day and an ultimate daily capacity of 200,000 barrels. Alberta oil from this pipeline will be supplied to west coast refineries located in both British Columbia and Washington.

Alberta's natural gas production has been used almost entirely for the domestic market but in June, 1952, the Alberta Government granted permission for 42 billion cubic feet of natural gas a year to be exported to British Columbia and the American Northwest for a period of five years. Westcoast Transmission Limited may construct a pipeline from the Peace River country to the State of Washington with a branch line to Vancouver. A gathering and distribution system, comprising 100 miles of main line and 111 miles of branch line, will be constructed in Alberta to make natural gas available to towns in the Peace River area. Construction of this line is awaiting approval by the U.S. Federal Power Commission.

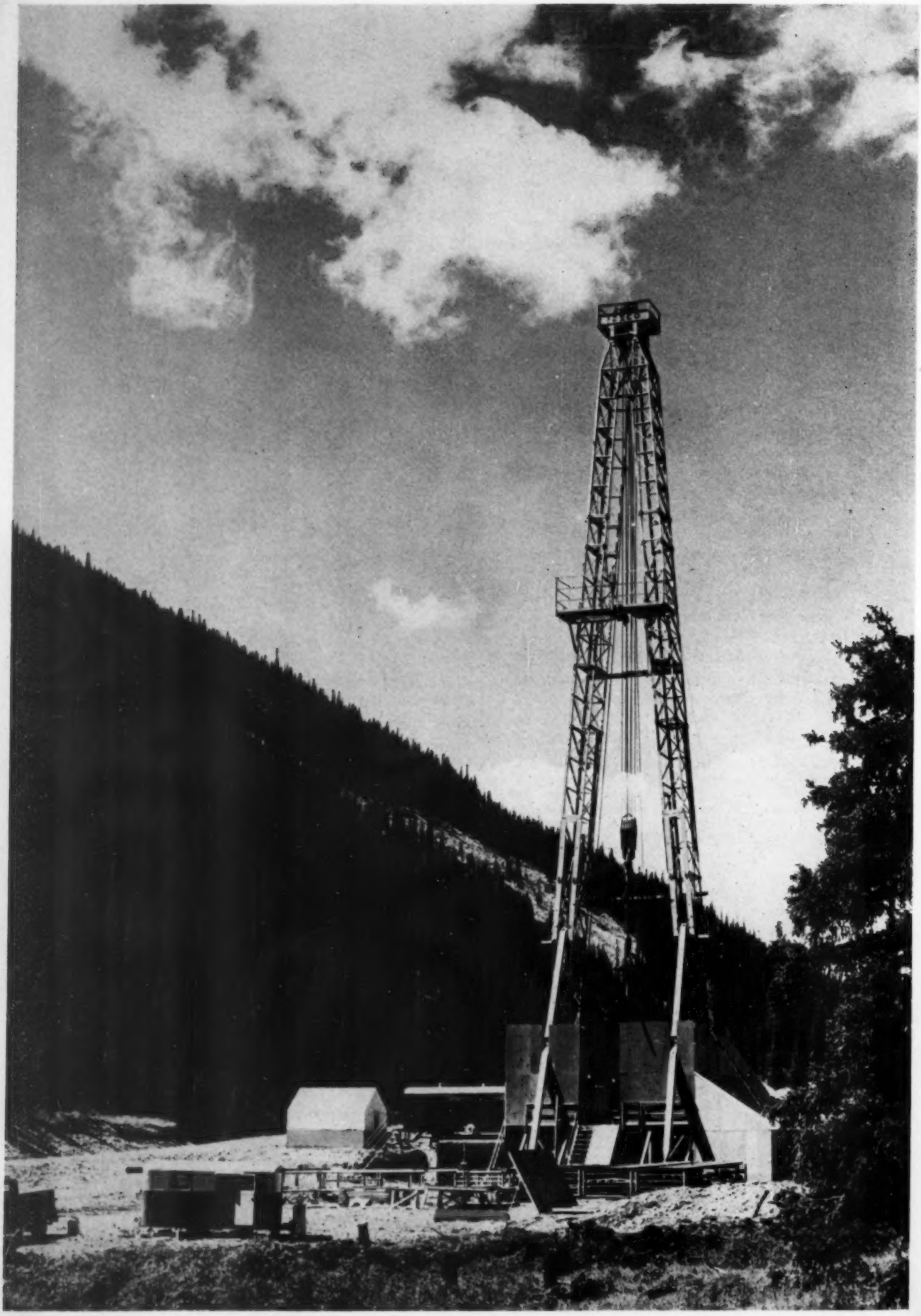
Export to the eastern markets is the next probable step in the evolution of the natural gas industry. The heavily industrialized and thickly populated provinces of Ontario and Quebec are the largest potential market for Alberta's natural gas but as yet eastern export is a theoretical question. Permission for export must be granted by the Alberta Petroleum and Natural Gas Conservation Board but it would appear now that Alberta has a large surplus of natural gas over present and future needs. A network of gathering lines connecting all Alberta gasfields and facilities at Pincher Creek to remove all economically valuable by-products from the wet gas produced in that field is likely to be a preliminary condition to export of natural gas.

Piping the gas east has brought forth a number of proposals, the total cost of which would be well over $400,000,000. The outstanding proposal is for an all-Canadian pipeline, 1,780 miles long and 30 inches in diameter, supplying 300 million cubic feet a day to Toronto. A smaller diameter line it is suggested might carry gas on to Montreal while the line could be tapped to supply the



One of the eight thousand workers employed in Alberta's forest industry. He is felling a large spruce by means of a chain saw. Production has greatly increased through the use of power driven saws.

Magnificent trout, like this one, may be caught in Alberta. Commercial fishing is rapidly increasing and now provides employment for five thousand persons at the peak of the season.



Fort William-Port Arthur market and the numerous lumbering and mining operations in northern Ontario.

Alberta's tremendous oil and natural gas resources have stimulated the growth of a chemical industry. Three large plants now being completed will have a far-reaching effect on the Alberta economy and will serve as parents for a large family of smaller secondary industries which will utilize the raw materials produced by the larger plants.

These three chemical projects are the plants of the Canadian Chemical Co. and Canadian Industries Limited and the refinery of Sherritt-Gordon Mines. Canadian Chemical's $55,000,000 plant will use British Columbia woodpulp and Alberta petroleum gases to produce cellulose acetate and acetate staple fibre and filament yarns as well as many organic chemicals.

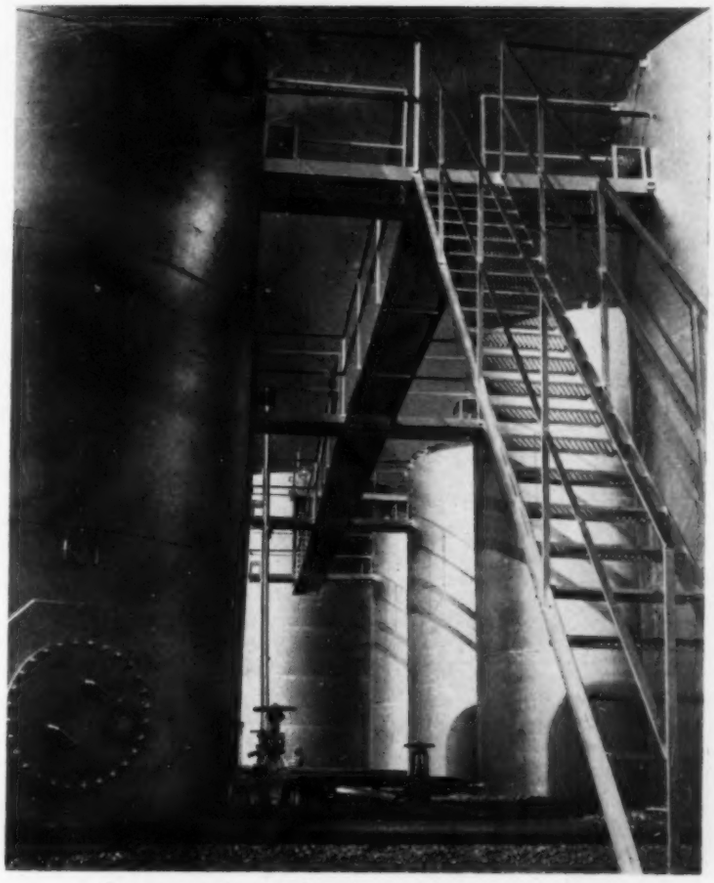
The Canadian Industries Limited plant will produce 6,000 tons of polythene flakes annually, more than eight times the amount previously available in Canada through American and British imports.

Sherritt-Gordon's refinery at Fort Saskatchewan will produce ammonia from natural gas and use this in a metallurgical process to recover nickel, copper and cobalt. Development of immense ore bodies in the Lynn Lake area of northern Manitoba has provided a long-term source of raw materials.

Sulphur plants are another result of petroleum development. Sulphur is being produced at Jumping Pound and Turner Valley and several more plants are planned. Large salt deposits provide a foundation for an alkali industry but only one salt plant is operating in Alberta. This plant produced 25,000 tons of salt in 1952. A $3,000,000 plant, at Duvernay, utilizes local supplies of salt and natural gas to produce twenty-two tons of caustic soda and chlorine daily. The plant is designed to supply the western market with caustic soda, soda, muriatic acid and chlorine.

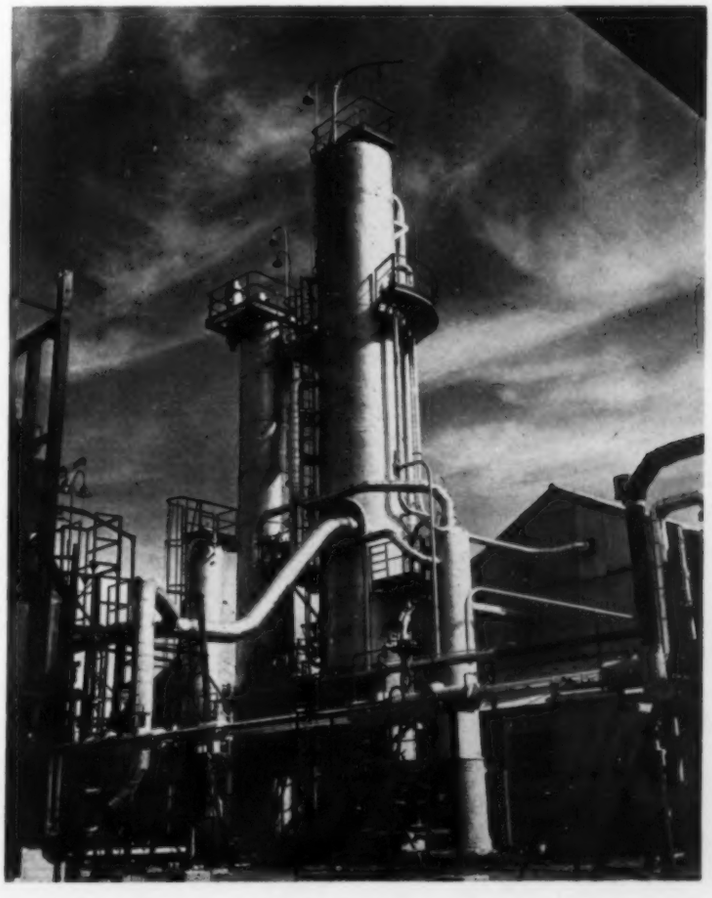
Awaiting large scale development are the oil sands deposits of the Athabasca River

The search for oil involves expenditures of millions of dollars and penetration into remote districts such as this section of the Alberta foothills where a drilling rig has spudded in.



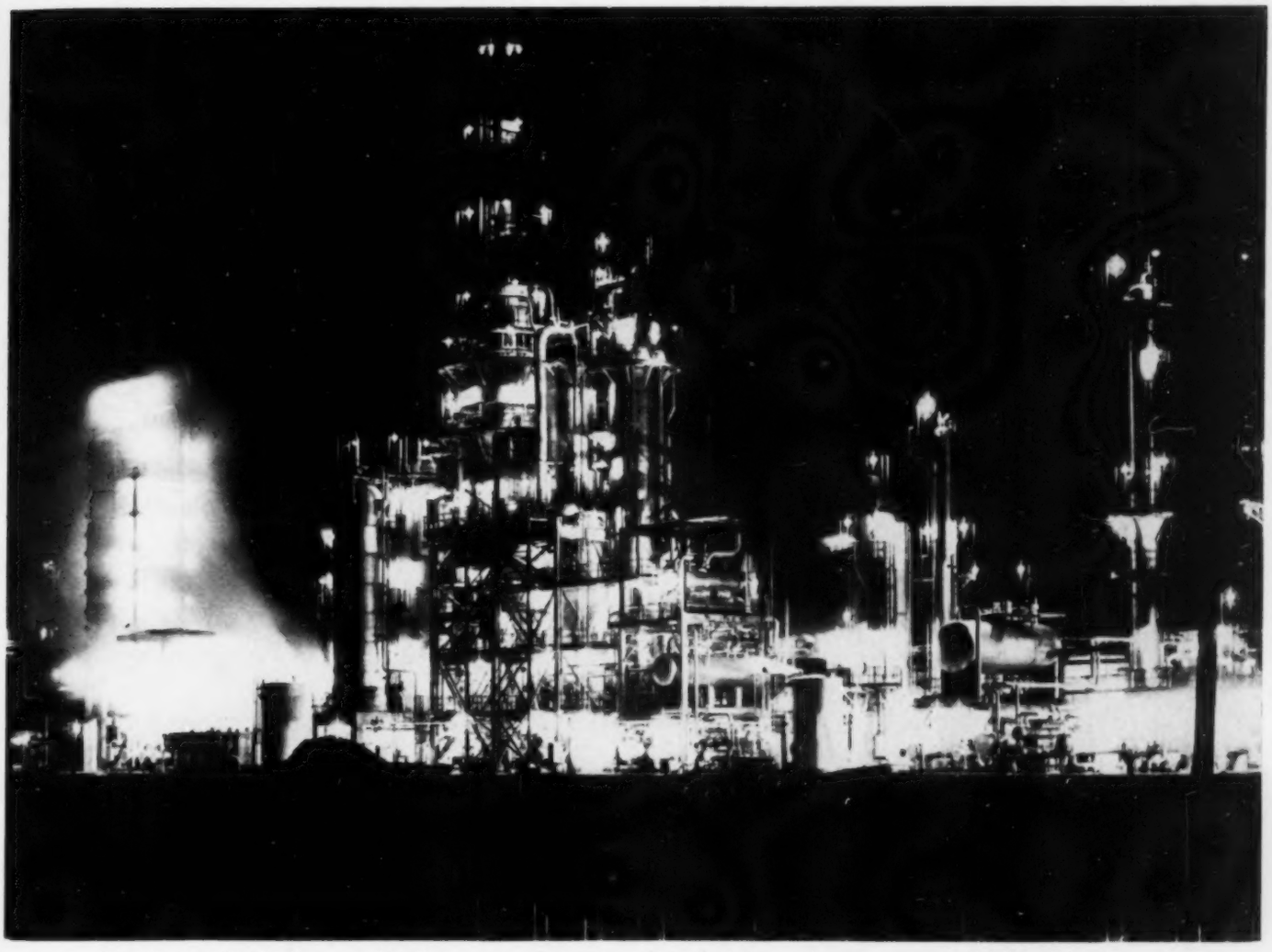
Storage tanks at Edmonton refinery.

The gas recovery section in one of Alberta's oil refineries.



Throughout the cold prairie winters, industrial activity continues unabated as in this wintry scene at Edmonton.

Propane tanks to hold the gas which will serve Alberta farmers far from natural gas distribution lines are fabricated in Calgary, Alberta.



The blazing lights from an oil refinery near Edmonton show that the work goes on ceaselessly night and day and that the production of oil is a 'round the clock' industry.

which contain the world's largest known oil deposits. Containing between 100 and 250 billion barrels of oil, the sands have been studied for more than thirty years to find a method of extracting the oil economically. Government-sponsored investigation led to the preparation of the Blair Report, named after its author, S. M. Blair, of Toronto. This report, stating that the oil sands could be excavated, delivered to a plant, separated, distilled and transported to market at the cost of $3.10 a barrel, revived interest in the sands and a number of companies are carrying out exploratory programs in the area.

Alberta contains more than three-quarters of Canada's coal reserves and in 1952 produced 7,194,472 tons from 177 coal mines. The coal industry employs 7,000 persons and has a payroll of more than $21,000,000 a year.

Another important mineral industry is the clay products industry which is based at the city of Medicine Hat. With a total value of production of $2,150,726 in 1952, the clay products industry produces a variety of earthenware pots, crocks, ornaments and tableware.

Alberta's electric power is derived from water, coal, natural gas and fuel oil, and more than 1,200,000,000 kilowatt hours were generated in 1952. The total power line mileage is 22,057 miles of which 13,721 are lines serving farms. Potential water-power in Alberta approximates 463,000 horsepower ordinary flow or 1,208,880 horsepower at ordinary six-month flow. Developed horsepower now in use is 208,000.

Medicine Hat's clay product industry is an important and unique phase of Alberta's manufacturing industry.

The Edmonton Municipal Airport, key[illegible] the junction of many world air routes[illegible]

Manufacturers seeking new markets or branch plant locations in Alberta are helped through the Industrial Development Branch of the Department of Economic Affairs. This branch assists manufacturers and businessmen by providing detailed information on labour, sources of raw material, markets, taxation, power, industrial sites and transportation facilities.

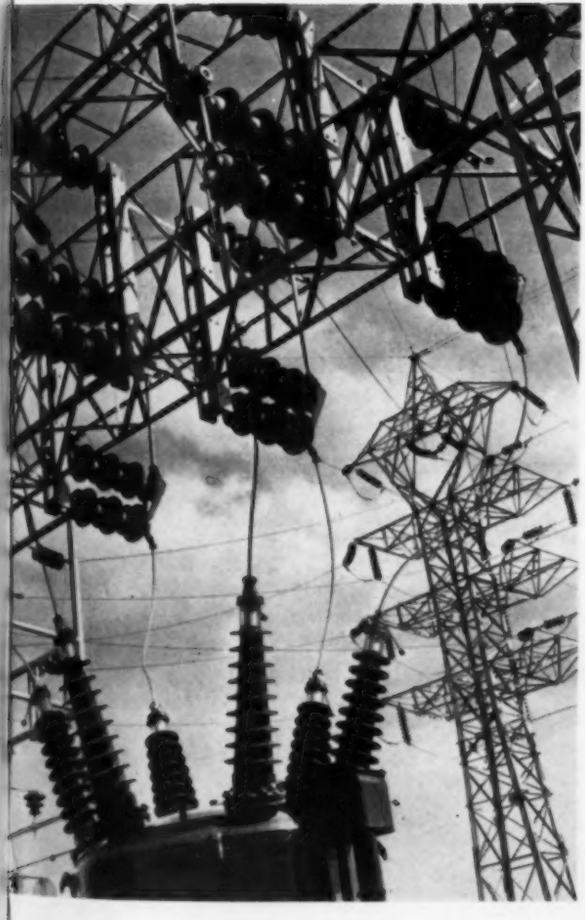
Strip mining has helped to make coal mining more productive and economical. Here a drag line which has dug deep into this Crowsnest Pass coal seam loads a truck with coal.

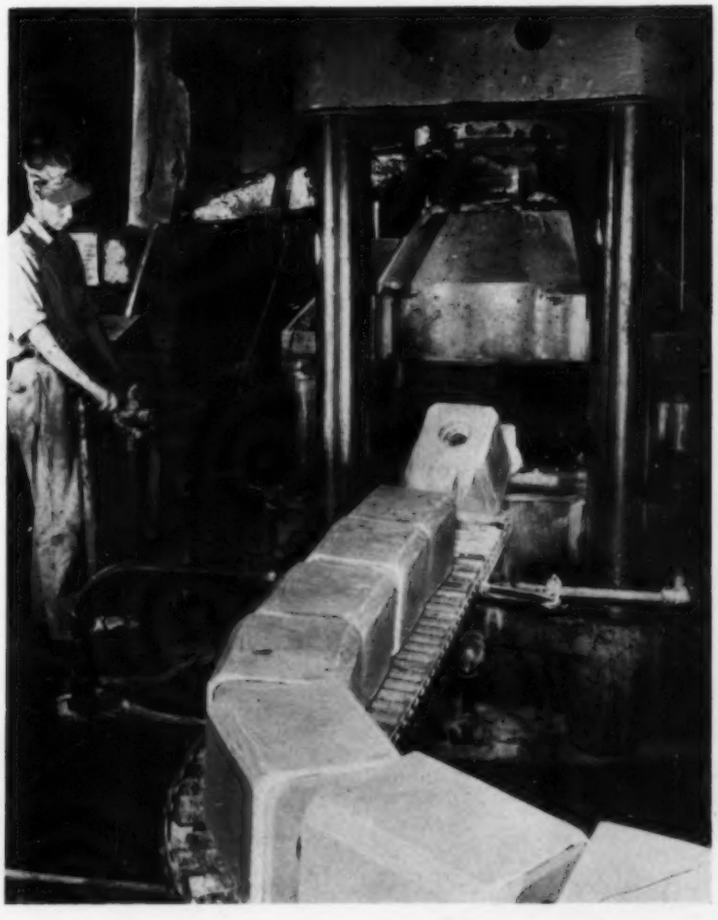
Right:—Alberta's power industry has been pressed to keep up with demands for increasing supplies of power but is steadily increasing its capacity and extending its net of transmission lines.

Extreme right:—Blocks of salt emerge from this press at the salt plant at Lindbergh, Alberta.

in the province's airways system is at the take-off spot for Northern Canada.

Railway axles and wheels produced in the Canadian National Railway shops at Edmonton.





A stone axe found in British Columbia, six miles from the town of Hazelton on the Skeena River.
Bettie Kerkham

The Stone Axe

by A. F. FLUCKE

WHEN modern man wishes to chop down a tree (a desire, which in these days of chain saws and radiant heating, buds only in the breasts of small boys, campers and die-hard, old-school loggers), he makes use of quite a different implement from that which his Stone Age forbears wielded for the same purpose. Although both are termed "axes" and bear a marked similarity in general appearance, the axe of the Stone Age man was made from different material, was formed to a different shape, and was used in a different manner from the steel-headed tool which today mutilates the fingers of unfortunate kindling choppers.

On the Pacific coast, where, before the coming of the white man, giant cedar trees were abundant and wood was the principal material used by the Indians to construct shelters and canoes, the stone axe of the type shown was an important domestic tool, not a weapon of war. With it trees of tremendous girth were felled ready to be split into thick planks for house walls, or to be hollowed out as canoes.

The stone axe was usually made from some hard, fine-grained rock. Whenever possible the Indians of the north Pacific coast used a form of jade, called nephrite—a smooth, hard mineral usually of greenish

colour. Because this stone is also tough and does not fracture easily, it will hold a fine cutting edge.

A large chunk of nephrite could be reduced to several pieces of appropriate size by being deeply grooved or sawn with a narrow piece of quartzite or some other type of coarse, abrasive rock. Sand and water poured into the groove helped the action of this crude stone-cutting tool. When the groove was deep enough, perhaps an inch or two, the segment needed was broken off by a sharp blow. Grinding down this rough slab of rock to the required size and shape was a long and extremely arduous job. The process was simply that of rubbing the piece vigorously with other pieces of rock until it looked something like a wedge, but much thicker. The lower side which was to fit against the handle was ground very straight and flat, while the upper side was rounded slightly and grooved at the thick end to take the hide or bark lashing that would hold it firmly to the handle. Although the size of stone axe heads varied, many of them weighed as much as seven to eight pounds and others were even heavier. The one in the picture weighs about seven pounds and is over twelve inches long.

The handle for the axe was made from a tree branch with a short section of the trunk left on to form a platform for the stone head. The two were lashed tightly together with the cutting edge of the head at right-angles to the plane of the handle—exactly the opposite relationship to that of the steel axe we use today.

With this rather clumsy-looking implement, the Indian was remarkably dextrous. He used it with short, powerful strokes, hacking and chipping across the grain of the tree instead of chopping downward with the grain as we do with a steel axe. In the picture, the cross-grain marks show quite clearly. The soft wood of even the largest cedar trees yielded to this attack fairly quickly.

Because of the manner in which the axe was used, and also because of the angle which the platform of the handle formed with the shank, the latter was quite short, being usually between twenty to twenty-four inches long.

The partially-chopped tree and the stone axe shown in the photograph are now in the Provincial Museum at Victoria, B.C. They were found close together—the axe-head covered with a thick layer of forest debris. The original handle and lashings had long before rotted away. We can imagine the evening darkness closing in on a perspiring, brown-skinned man who dropped his axe carelessly beside his work, intending to return the next day. Apparently, the spirits, which he so firmly believed inhabited his world, had other designs for his future.

A cedar log, now in the National Museum, Ottawa, which bears definite marks of stone axe work.
National Museum of Canada

EDITOR'S NOTE-BOOK

Dr. John Davis (*Aeroplane Industry in Canada*) is director of the economics division of the Canadian Department of Defence Production.—Sir William P. Hildred*(*Canada and World Air Transport*) was formerly Director General of Civil Aviation in the United Kingdom. He is now Director General of the International Air Transport Association.—Baron (*Dancers of Thailand*) is a well-known British photographer. His photographs of the royal family have received wide distribution.—Ralph R. Moore (*An Economic View of Alberta*) has served the Alberta Government for thirty-five years. He is now Deputy Minister of Economic Affairs and Chairman of the Industrial Board.—A. F. Flucke (*The Stone Axe*) is on the staff of the Provincial Archives of British Columbia and is the author of a series of booklets published by the Department of Education.

* * *

***Biographical Note**

Sir William Percival Hildred, C.B., O.B.E.

Director General,

International Air Transport Association

Sir William Hildred was born in Yorkshire, England, and was educated at the University of Sheffield. He served during the first World War in the First Yorkshire and Lancashire Regiment, and on return to civil life he entered the British Treasury. In 1926 he became Finance Officer to the Empire Marketing Board, and in 1935 when currency restrictions began to be imposed by many European governments, he became Deputy General Manager of the Exports Credit Guarantee Department.

In 1938 he became Deputy Director General of Civil Aviation for the United Kingdom, and on the outbreak of the second World War he was appointed Principal Assistant Secretary in the Air Ministry and subsequently served under Lord Beaverbrook in the Ministry of Aircraft Production.

In June 1941 he came to Canada to take up his position at Montreal in organizing the RAF Ferry Command, and after the flight delivery of the bombers was firmly established, he returned to England and was appointed Director General of Civil Aviation in the United Kingdom. In 1945 he became the first permanent head of the new Ministry of Civil Aviation. In 1946 he was elected to his present position as Director General of IATA at Montreal.

He was knighted by King George VI in 1944 and he also received foreign awards for his services to aviation from the Netherlands and Belgium. S.S.

AMONGST THE NEW BOOKS

Ontario

by Marjorie Wilkins Campbell

(The Ryerson Press, Toronto. $4.00)

This is a gay and breezy tourist book which takes us all around Ontario. It deals cheerfully with the scenery, the history, and the modes of travel throughout Canada's most populous province. The author's route is well shown on the inside cover map, and she invites us to share her enthusiasms, pleasures and disappointments as she follows the trails old and new by car, train, plane, canoe, lake-boat and on foot. With her at Windsor, we can stand on Canadian soil, gazing northwards into a big city of our American neighbours to the south. We can go up to James Bay, which is far north to most of us, but it is plain south to those who dwell up beyond Moosonee. Ontario's mining and industrial interests are set forth with a wealth of historical anecdote, and the illustrations, all set together in the centre of the book, are well chosen and representative of what Ontario's city and country life has to offer.

It seems a pity that a little more care was not bestowed on eradicating small errors which are numerous enough to irritate the reader. One might, for example, have ignored such an obvious misprint as occurs on page ten, "the coach used by King George IV during his visit to Toronto" were it not for the fact that this is only one of so many similar slips. The river Ganaraska is twice misspelt as Garanaska on page fifty-nine. A reference to H.R.H. Queen Elizabeth seems rather heedless; and St. George Cathedral at Kingston has lost its possessive "s". A notice that "smoking is strictly forbidden" appears in French as "defense expresse de fermer" and on page one hundred and fifty-three the word "porchere" is rendered as "swine". The French word *porchère* is the feminine of swineherd, and *porcherie* (piggery) is probably what is intended, as the reference concerns the Dominion Experimental Farm at Kapuskasing.

The book ends with an interesting chapter on Ottawa; attention is drawn to the French Embassy, the Russian Embassy and "the fourteen other embassies." This is a sad understatement of Ottawa's dignity as a diplomatic centre; the city has twenty-three fully accredited embassies, and there are many legations and High Commissioners' Offices, whose presence adds greatly to the vitality of Canada's capital.

These trifling blemishes may be annoying by their quantity rather than their quality, but they need not detract from the value of a book which gives so much useful information about Ontario, in a style that is always light and pleasant to read. S. SEELEY

* * *

The Sudden View

by Sybille Bedford

(Longmans, Green & Co., Toronto, $3.75)

This book of travel is sparkling all through with the delightful element of surprise. Nothing happens according to rule or plan, not even the author's destination; she set out for Peru and landed in Mexico, travelling in a third class Mexican day coach because the sleepers which she and her friend had booked, already contained people asleep in them.

To her gay and inconsequent travels, Mrs. Bedford adds a light touch of historical background so that one's attention is held vividly at the fantastic contrasts between time and place. In Mexico city one may be jostled into, and out of, the gutter by a native water carrier or a Buick saloon; one may step on spilled mangoes or a basin of live charcoal; to avoid a tethered chicken one "bumps into a Red Indian gentleman in a tight black suit". Here, she says, the vertical sun aims at your head like a dagger and you are facing "what Cortez faced in the absolute five hundred years ago." Yet she captures the reader in her own generous enjoyment of everything, an enjoyment based on comprehension of the mixed and seething life around her whether it be commercial, agrarian, or the dire poverty of the descendants of the Aztecs, or the comfort of the large property owners who revel in every luxury that their own tropics, and the industry of other nations can provide for them. Mrs. Bedford travels on, meeting with everything that no one could possibly expect, till she reaches the coast and hears a ruthless roar like a subway and discovers that it is the Pacific Ocean. When she seeks to take a boat she is told that the port has been silted up for twenty years, and she finally escapes by the day before yesterday's train, leaving us with a picture so gay, brilliant and sympathetic that we immediately long to go in search of the realization of that Mexican spell that she has cast over us. S. SEELEY

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Who Speaks For Man?

by Norman Cousins

(Macmillan, Toronto, $4.00)

Mr. Norman Cousins, editor of *The Saturday Review*, writes with vast authority gathered from contacts with men all over the world, and under a very wide range of conditions. From his experiences at Bikini, in his travels through India and Pakistan, and in European camps for Displaced Persons, Mr. Cousins has had ample opportunity to observe that though there are spokesmen for Man's religious, social, and economic orders, yet as a member of the human race he is without a spokesman. The author, however, has great faith in the federated United Nations and believes that they can produce the right kind of world government by growing into a body capable of creating and enforcing world law. This result should satisfy his rhetorical question.

This is a book which stimulates broad thinking on international affairs, and will be a definite help to those who are studying to elucidate some of those tangled problems which at present are such a formidable barrier to the achievement of world peace. S. SEELEY

The Aga Khan

by Stanley Jackson

(Ryerson, Toronto, $3.75)

Stanley Jackson here gives us an opportunity of understanding better and appreciating more fully one of the most fabulous characters of modern times. Kipling knew the West as well as he did the East and predicted that "never the twain shall meet", but surely the Aga Khan comes as close to effecting such a meeting as any man can, or is it possible that he has kept his two worlds and his two lives in separate mental compartments?

At the same time the spiritual leader (and this is no tongue-in-cheek leadership) of some ten million Moslems, and a habitué of London, Paris, and the Riviera, owner and breeder of race horses that have brought in some two million pounds to add to his already immense fortune of about six hundred million pounds, the Aga Khan is no more a religious fanatic than he is a mere playboy of the Western world. He is, rather, one of the shrewdest and most capable of living statesmen, a man of great learning and immense ability. Anybody who is disposed to underrate the importance and effectiveness of oriental diplomats would do well to read and ponder this competent and well-written sketch. DOUGLAS LEECHMAN

Understanding the Weather

by T. Morris Longstreth

(Macmillan, Toronto, $3.00)

Anglo-Saxons are notorious for their perpetual preoccupation with the weather and for their failure to do anything about it. Morris Longstreth has long been interested in this subject and he produced his first book on it, *Reading the Weather*, in 1914. After the First Great War he tried again with *Knowing the Weather* and now this third book appears, *Understanding the Weather*. The successive titles seem to suggest that the author has been an unremitting student and that his confidence has grown with his experience.

The importance of the weather in human affairs is being more fully realized year by year and we have progressed from the period of study and observation which dates roughly from 1823, when the Meteorological Society of London was formed, to that of daily forecasts (which have been issued for about a hundred years), and now we are at last attempting to do something about the weather, chiefly in the field of rain-making.

For those who are interested in these subjects, and who is not, this book provides an excellent introduction. It is thorough enough to provide a sound base for further study, but not so technical as to discourage the beginner. The explanations of the causes and effects of atmospheric changes are simple but adequate; various types of clouds are described in the text and illustrated by an excellent series of photographs; and there are accounts of professional and amateur forecasting and rain-making. There is also a useful glossary of technical terms. The author has listed the record wind velocities, high and low temperatures, record precipitation and such unusual phenomena, and there is a bibliography which, while not attempting to be exhaustive, will readily lead the reader further into the field of meteorology.

DOUGLAS LEECHMAN

The Bruce Beckons

by W. Sherwood Fox

(University of Toronto Press, $4.00)

The Bruce Peninsula of Ontario, thrust northwestward between Lake Huron and Georgian Bay, seems to be a geographical unit endowed with a personality of its own. People from "The Bruce", like Texans, usually manage to bring their home land into the conversation and, now that Dr. Fox has presented us with a biography of this interesting area, we begin to understand their love for it.

Those of us who have visited the Bruce may find the wealth of detail a little more than we really need, but at least we have the satisfaction of knowing that the author writes from a long and intimate acquaintance with his subject and his training in science guarantees accuracy in his account of the many aspects of the district with which he deals.

The first general descriptive chapter is excellent and serves to give the reader his bearings; the rest of the book, written in a somewhat more leisurely style, tells us of shipping, farming, fishing, lumbering, and the history and botany of the peninsula. The drawings by Clare Bice and Vincent Elliott are admirable. A larger and more detailed map would have been most useful.

DOUGLAS LEECHMAN

Beyond Horizons

by Carleton Mitchell

(Norton, New York, $3.95)

"This book was written for all who love the sea" says the author and those of us who are familiar with other books of his, such as *Islands to Windward* and *The Yachtsman's Camera*, know very well that he himself is certainly one of them. This is a collection of fairly extensive quotations from early books of travel, with remarks and comments, giving us the actual first-hand details of the discovery of Tahiti, the rescue of Alexander Selkirk, Bligh's own story of his epic boat voyage after the mutiny on the *Bounty*, and other romantic episodes of the great days of adventure and discovery, "when men quested beyond known horizons, and survival was accepted as a matter of chance". It makes excellent reading.

Carleton Mitchell, in his notes, discusses many of the allusions which might be obscure to a landsman or to one not familiar with maritime history. There are no photographs, understandably enough, and the text is unrelieved except for some neat little line drawings of nautical subjects. I should have given a good deal to hear the author's remarks when first he noticed that the scale on the end-paper maps is grossly inaccurate, making it sixty nautical miles from London to New York. DOUGLAS LEECHMAN

Anthropological Papers of the University of Alaska

Vol. 1, No. 1. December 1952. $1.50

This is the first of a projected series of papers on anthropological subjects to be published by the University of Alaska, at once the most remote and one of the most progressive of United States universities. It is hoped that the series will be long continued and that it will maintain the high standard of scholarship seen in the preceding papers on similar subjects which appeared in the University's *Miscellaneous Publications*.

In this issue four papers appear. The first is by Giddings, on the "Eskimo" type of kinship system, in which he points out the loose and unprecise way in which the term "Eskimo" is used. Heizer contributes valuable notes on some specimens from Kodiak Island collected sixty or seventy years ago. Laughlin writes on the Aleuts, a much neglected people; and Oswalt contributes a detailed study of Hooper Bay, an Eskimo community dating from about 1600 A.D. to the present.

All of these are important contributions to the larger problem of the migration of man from the Old World to the New. Ethnologists and archaeologists working in Alaska and the Yukon have an unusual advantage in that they stand right on the principal route of migration and also in the fact that the Eskimos and Indians of those regions are not so far removed from aboriginal life and culture as are the natives of other parts of the continent, who have been longer subjected to the influence of our culture. DOUGLAS LEECHMAN

JETMEN OF AVRO

Every day test pilots of AVRO Canada draw assignments which to them are routine, but to earth-bound mortals are of epic proportions.

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AVRO Canada considers it is fortunate in having such men as Don Rogers, Michael Cooper-Slipper, Peter Cope, Jan Zurakowski and Chris Pike at the controls of its aircraft. Pilots all, yes, but each of these flight scientists also contributes ideas, methods and answers to the fund of jet flight information, without which there would be no progress.

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